USDA United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the United States Department of the Interior, Bureau of Indian Affairs, and the South Dakota Agricultural Experiment Station at South Dakota State University

Soil Survey of Hyde County, South Dakota

How to Use This Soil Survey

General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

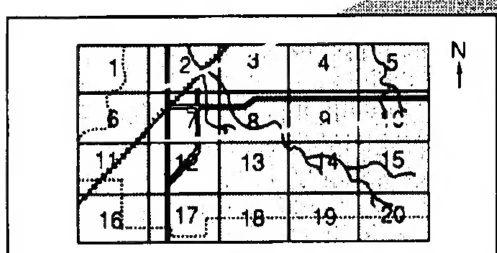
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

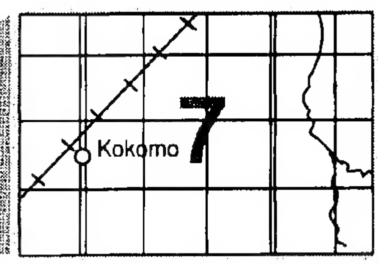
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map units symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.



INDEX TO MAP SHEETS



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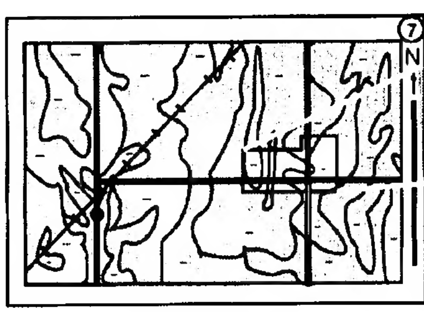

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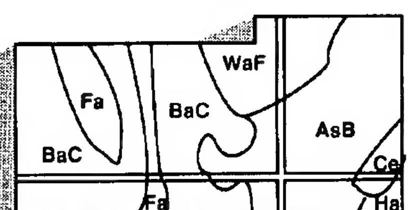

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for this soil survey was completed in 1991. Soil names and descriptions were approved in 1992. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1992. This survey was made cooperatively by the Natural Resources Conservation Service; the United States Department of the Interior, Bureau of Indian Affairs; and the South Dakota Agricultural Experiment Station at South Dakota State University. It is part of the technical assistance furnished to the Hyde County Conservation District.

Some financial assistance was furnished by the South Dakota Department of Revenue, the Bureau of Indian Affairs, and Hyde County.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Cattle grazing in an area of Stickney-Java-Hoven complex, 0 to 4 percent slopes.

Contents

Issued 1998

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Hyde County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or are subject to flooding. Some are shallow over bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the South Dakota Cooperative Extension Service at South Dakota State University.

Dean F. Fisher
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Hyde County, South Dakota

By Walter T. Schaefer, Jr., Natural Resources Conservation Service

Soils surveyed by Walter T. Schaefer, Jr., Nilo G. Reber, and Thomas M. Schumacher, Natural Resources Conservation Service, and Lawrence P. Haugen, private contractor

in cooperation with
United States Department of the Interior, Bureau of Indian Affairs, and the
South Dakota Agricultural Experiment Station at South Dakota State University

HYDE COUNTY is in the central part of South Dakota (fig. 1). It has a total area of 555,142 acres. About 24,237 acres is administered by the Bureau of Indian Affairs and 650 acres by the Corps of Engineers.

According to the 1990 U.S. Census, Hyde County had a population of 1,686. Highmore, which is the county seat and the largest town in the county, had a population of 835. Holabird and Stephan are the other towns in the county.

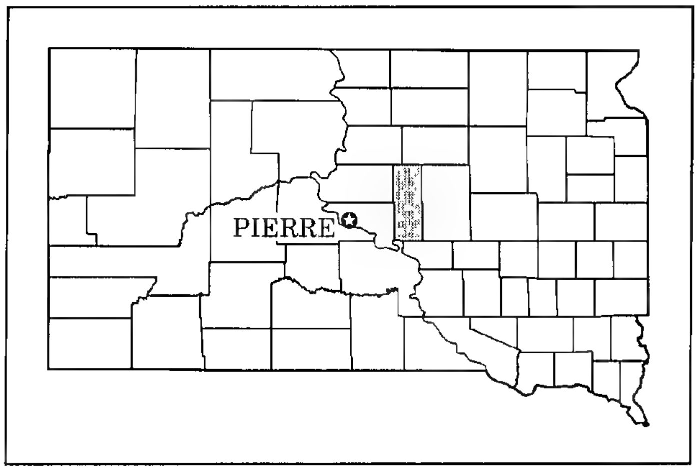

Figure 1.—Location of Hyde County in South Dakota.

General Nature of the County

This section gives general information about Hyde County. It describes climate; physiography, relief, and drainage; settlement; ranching and farming; and natural resources.

Climate

Prepared by the National Cl.matic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the county as recorded at Highmore in the period 1951 to 1987. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 18 degrees F, and the average daily minimum temperature is 7 degrees F. The lowest temperature on record, which occurred at Highmore on December 24, 1983, was -36 degrees F. In summer, the average temperature is 71 degrees F, and the average daily maximum temperature is 86 degrees F. The highest recorded temperature, which occurred at Highmore on August 13, 1965, is 113 degrees F.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 19.27 inches. Of this, about 15 inches, or 75 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 12 inches. The heaviest 1-day rainfall during the period of record was 5.90 inches at Highmore on July 2, 1981. Thunderstorms occur on about 40 days each year.

The average seasonal snowfall is 35 inches. The

greatest snow depth at any one time during the period of record was 32 inches. On the average, 32 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines about 75 percent of the time possible in summer and about 55 percent in winter. The prevailing wind is from the south-southeast during the summer and from the north-northwest during the winter. The average wind speed is highest, about 14 miles per hour, in spring.

Physiography, Relief, and Drainage

Most areas in Hyde County are in the Coteau du Missouri division of the Great Plains physiographic province and the James Basin division of the Central Lowland physiographic province *(3)*. The extreme southwestern part of the county, however, is in the Missouri River Trench. Lake Sharpe is an impoundment on the river.

The northern one-fourth of the county consists of hills known as the Orient Hills *(4)*. These hills are drained by North Medicine Creek. The north-central part of the county consists of a broad, low area known as the Great Ree Valley, which is bounded on the south by the Ree Hills *(4)*. The Great Ree Valley is drained by Wolf Creek. The Ree Hills are drained by South Fork Medicine Knoll, South Chapelle, Chapelle, Elm, Campbell, and West Fork Elm Creeks. The extreme southwestern portion of the county consists of Pierre shale hills that become more steep along Lake Sharpe. These hills are drained mainly by Chaney Rush Creek.

The elevation of the county ranges from about 1,423 to 2,184 feet above sea level. The lowest elevation is along Lake Sharpe, and the highest elevation is on Peno Hill, south of Highmore.

Settlement

Hyde County was created in 1882, and it was organized in 1883 by authority of the Dakota Territorial Legislature *(6)*. It was named after James Hyde, who came to the Dakota Territory following the end of the Civil War. Active settlement occurred in 1882 as a result of the westward extension of the Chicago and Northwestern Railway *(7)*. In the initially plan, Hyde County was to be formed out of the southern halves of what are now Hyde and Hand Counties; however, when the county was organized, the present area was allotted. Highmore was elected as county seat in 1884.

Hyde County is served by U.S. Highway 14 and State Highways 26, 34, and 47. Railroad service is provided by the Dakota Minnesota & Eastern Railroad, which has a total of 18.36 miles of rail in the county.

Ranching and Farming

Ranching is the main enterprise in the county, and the main type of livestock is beef cattle. About 84 percent of the farm income in the county is derived from the sale of livestock and livestock products *(12)*. Most of the remaining farm income is derived from the sale of wheat.

In 1992, the county had 240 ranches and farms that averaged about 2,271 acres in size *(12)*. The trend is toward fewer, larger ranches and farms. Many of the ranches in the southern part of the county lease additional grazing land through the Bureau of Indian Affairs.

About 64 percent of the acreage in the county is range, and about 32 percent is used for cultivated crops or for tame pasture and hay *(9)*. Spring wheat is the main crop. Winter wheat is the second most common crop, and it is grown under a summer-fallow system of management. Corn, oats, barley, sorghum, sunflowers, and alfalfa are also grown. Corn and sorghum are mainly grown for silage.

The Hyde County Soil and Water Conservation District was organized in 1953 *(5)*. It has been instrumental in planting trees, which help to control wind erosion, protect farmsteads, and provide cover for wildlife.

Natural Resources

Soil is the most important natural resource in the county. It provides a growing medium for crops and for.the grasses grazed by livestock. Other natural resources include water, sand and gravel, and wildlife.

Lake Sharpe is an excellent source of water for domestic and industrial uses and for irrigation. Many small dams, dugouts, potholes, and artesian wells provide water for livestock in most parts of the county. The main source of water for domestic uses and for livestock is shallow wells.

Several sources of sand and gravel are scattered throughout the county. The deposits generally are unsuitable as construction material and concrete aggregate because of an excessive content of fine fragments of shale, chalk, and clay ironstone. They are suitable, however, as subgrade material for roads.

Antelope, white-tailed deer, mule deer, cottontail rabbits, jack rabbits, and upland birds, such as grouse and ring-necked pheasant, are the main wildlife resources in the county. Wetlands, which are mainly in the northern half of the county, can be used for the production of wetland wildlife. In the spring and fall, numerous species of ducks and geese migrate through the county. Lake Sharpe provides excellent opportunities for fishing.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions, or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These inclusions are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These inclusions are called contrasting, or dissimilar, inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The contrasting inclusions are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather is to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils in the associations are in a variety of landform positions (fig. 2). These different landform positions affect such characteristics as the amount of topsoil, the drainage class, the runoff rate, and the content of organic matter.

The 8 associations in Hyde County have been grouped for broad interpretive purposes. The associations and the groups are described on the pages that follow. The names of the associations do not coincide exactly with those on the general soil maps in the published surveys of Buffalo, Hand, Hughes, Faulk, Potter, and Sully Counties. Differences are the result of variations in the design and composition of the map units, variability within the physiographic area, or changes and refinements in series concepts.

Level to Moderately Steep, Loamy and Silty Soils on Till Plains and Moraines

These soils dominantly are level to undulating and rolling but are moderately steep in areas. They make up about 57 percent of the county. About 55 percent of the acreage supports native grasses and is used for grazing or hay. Wheat, barley, oats, and alfalfa are the main crops. Controlling erosion and conserving moisture are the main management concerns.

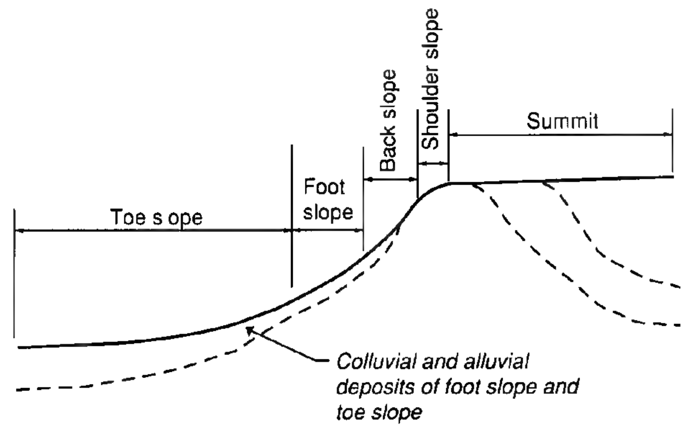

Figure 2.—Landform positions.

1. Glenham-Prosper-Java Association

Very deep, well drained and moderately well drained, nearly level and undulating, loamy soils that formed in glacial till and glacial till mantled with local alluvium

This association is on till plains that are characterized by small hills dissected by flat drainageways that commonly terminate in basins. The drainage pattern is poorly defined.

This association makes up about 28 percent of the county. It is about 45 percent Glenham soils, 20 percent Prosper soils, 15 percent Java soils, and 20 percent minor soils (fig. 3).

The well drained Glenham soils are on summits and back slopes. Slopes range from 0 to 6 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown clay loam in the upper part and grayish brown, calcareous clay loam in the lower part. The underlying material is light brownish gray, calcareous clay loam.

The moderately well drained Prosper soils are on lower back slopes and foot slopes. Slopes range from 0 to 4 percent. Typically, the surface soil is dark gray loam. The subsoil is dark grayish brown silty clay loam in the upper part and light brownish gray, calcareous clay loam in the

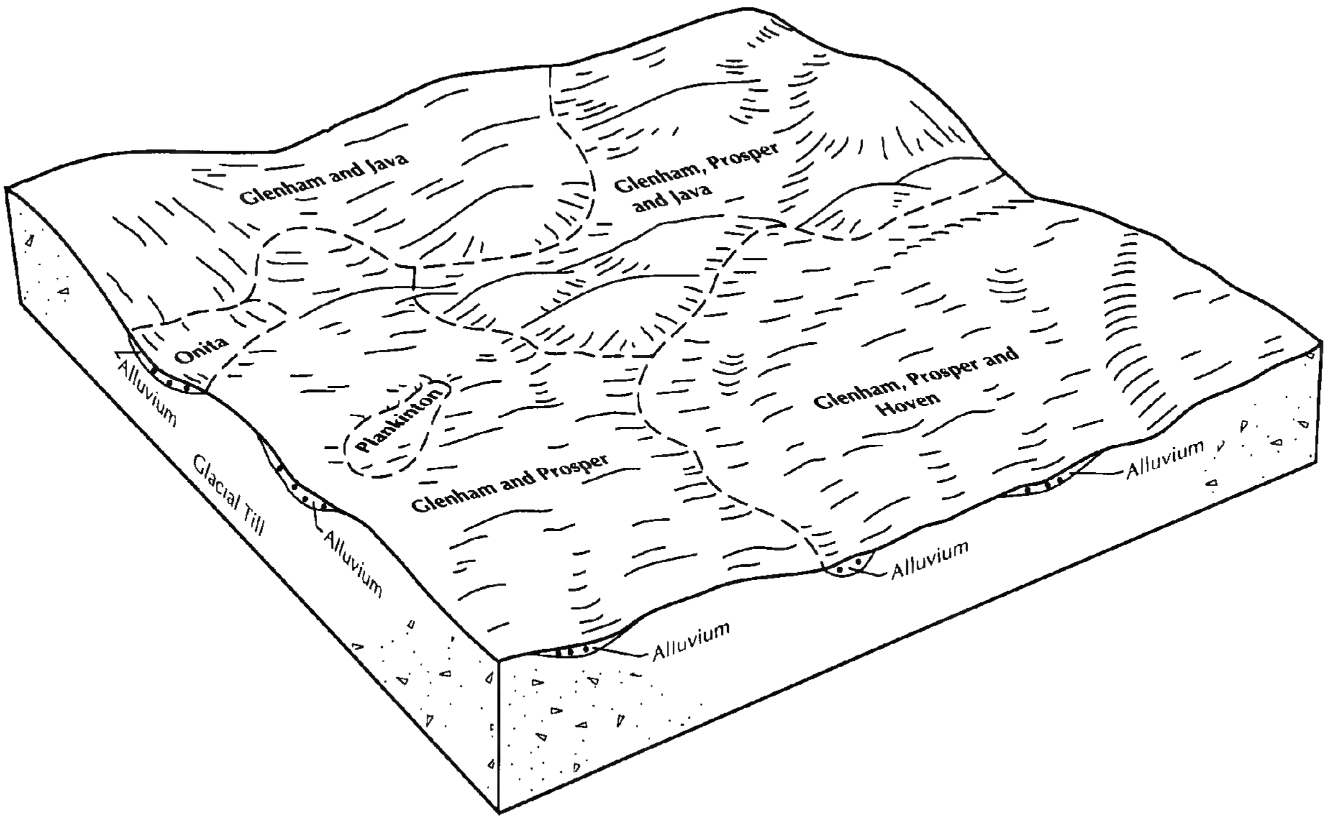

Figure 3.—Typical pattern of soils and parent material in the Glenham-Prosper-Java association.

lower part. The underlying layer is pale yellow, calcareous loam.

The well drained Java soils are on shoulder slopes. Slopes range from 1 to 6 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown clay loam in the upper part and grayish brown and light brownish gray, calcareous clay loam in the lower part. The underlying layer is light yellowish brown, calcareous clay loam.

Minor in this association are Hoven, Onita, and Plankinton soils. The poorly drained Hoven and Plankinton soils are in basins. Onita soils contain less sand throughout the profile. They are on foot slopes.

About 50 percent of this association is cropland, and about 50 percent supports native grasses used for grazing or hay. Wheat, barley, oats, and alfalfa are the main crops. Controlling water erosion and conserving moisture are the main management concerns. This association is suited to cultivated crops, tame pasture and hay, and range.

2. Java-Glenham Association

Very deep, well drained, undulating to rolling, loamy soils that formed in glacial till

This association is on till plains and moraines that are characterized by undulating to rolling hills interspersed with basins. Slopes dominantly are undulating to rolling but are moderately steep in some areas. The drainage pattern is poorly defined in the less sloping areas and is well defined in the strongly sloping and moderately steep areas.

This association makes up about 8 percent of the county. It is about 40 percent Java soils, 20 percent Glenham soils, and 40 percent minor soils.

The well drained Java soils are on shoulder slopes. Slopes range from 2 to 15 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown clay loam in the upper part and grayish brown and light brownish gray, calcareous clay loam in the lower part. The underlying layer is light yellowish brown, calcareous clay loam.

The well drained Glenham soils are on summits and back slopes. Slopes range from 2 to 9 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown clay loam in the upper part and grayish brown, calcareous clay loam in the lower part. The underlying layer is light brownish gray, calcareous clay loam.

Minor in this association are Betts, Delmont, Macken, Oahe, Prosper, and Talmo soils. Betts soils, which are on shoulder slopes, have lime closer to the surface than the soils in this association. Delmont and Talmo soils have gravelly material within a depth of 20 inches. They are on shoulder slopes. Oahe soils are 20 to 40 inches deep over gravelly material. They are on back slopes. The very poorly drained and poorly drained Macken soils are in basins. The moderately well drained Prosper soils are on foot slopes.

About 70 percent of this association supports native grasses and is used for grazing or hay. Controlling water erosion is the main management concern. In the less sloping areas, wheat, barley, oats, and alfalfa are the main crops grown. The less sloping areas of this association are suited to cultivated crops and tame pasture and hay. This association is suited to range.

3. Java-Betts Association

Very deep, well drained, moderately sloping to moderately steep, loamy soils that formed in glacial till

This association is on moraines that are characterized by dissected slopes breaking towards major drainageways. Slopes dominantly are strongly sloping and moderately steep but are steep in some areas. The drainage pattern is poorly defined in the moderately sloping areas and is well defined in the strongly sloping and moderately steep areas.

This association makes up about 1 percent of the county. It is about 40 percent Java soils, 30 percent Betts soils, and 30 percent minor soils.

The well drained Java soils are on back slopes. Slopes range from 6 to 25 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown clay loam in the upper part and grayish brown and light brownish gray, calcareous clay loam in the lower part. The underlying layer is light yellowish brown, calcareous clay loam.

The well drained Betts soils are on shoulder slopes. Slopes range from 6 to 25 percent. Typically, the surface layer is dark gray, calcareous loam. The subsoil is light brownish gray and light yellowish brown, calcareous clay loam. The underlying layer is grayish brown, calcareous clay loam.

Minor in this association are Delmont, Durrstein, Egas, Glenham, Oahe, Prosper, and Talmo soils. Delmont and Talmo soils have gravelly material within a depth of 20 inches. They are on shoulder slopes. Oahe soils are 20 to 40 inches deep over gravelly material. They are on back slopes. The poorly drained Durrstein and Egas soils are on low flood plains. Glenham soils are deeper over lime. They are on back slopes. The moderately well drained Prosper soils are on foot slopes.

About 95 percent of this association supports native grasses and is used for grazing. Controlling water erosion is the main management concern. This association is suited to range. It generally is unsuited to cultivated crops and tame pasture and hay.

4. Java-Stickney-Hoven Association

Very deep, well drained, moderately well drained, and poorly drained, level to undulating, loamy and silty soils that formed in glacial till and local alluvium

This association is on till plains that are characterized by small hills dissected by flat drainageways that terminate in basins. The drainage pattern is poorly defined.

This association makes up about 20 percent of the county. It is about 25 percent Java soils, 25 percent Stickney soils, 20 percent Hoven soils, and 30 percent minor soils.

The well drained Java soils are on shoulder slopes. Slopes range from 1 to 4 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown clay loam in the upper part and grayish brown and light brownish gray, calcareous clay loam in the lower part. The underlying layer is light yellowish brown, calcareous clay loam.

The moderately well drained Stickney soils are on foot slopes. Slopes are 0 to 2 percent. Typically, the surface layer is dark gray loam. The subsurface layer is gray silty clay loam. A transitional layer is gray silty clay loam. The subsoil is gray and grayish brown silty clay in the upper part. It is light brownish gray, mottled, calcareous clay loam that has accumulations of salts in the lower part. The underlying layer is light brownish gray, mottled, calcareous clay loam that has accumulations of salts.

The poorly drained Hoven soils are in basins. Slopes are 0 to 1 percent. Typically, the surface layer is gray silt loam. The subsoil is dark gray and gray silty clay and is calcareous in the lower part. The underlying layer is light brownish gray, calcareous clay loam.

Minor in this association are Cavo, Glenham, Jerauld, Plankinton, and Prosper soils. The moderately well drained Cavo and Jerauld soils have salts at a shallower

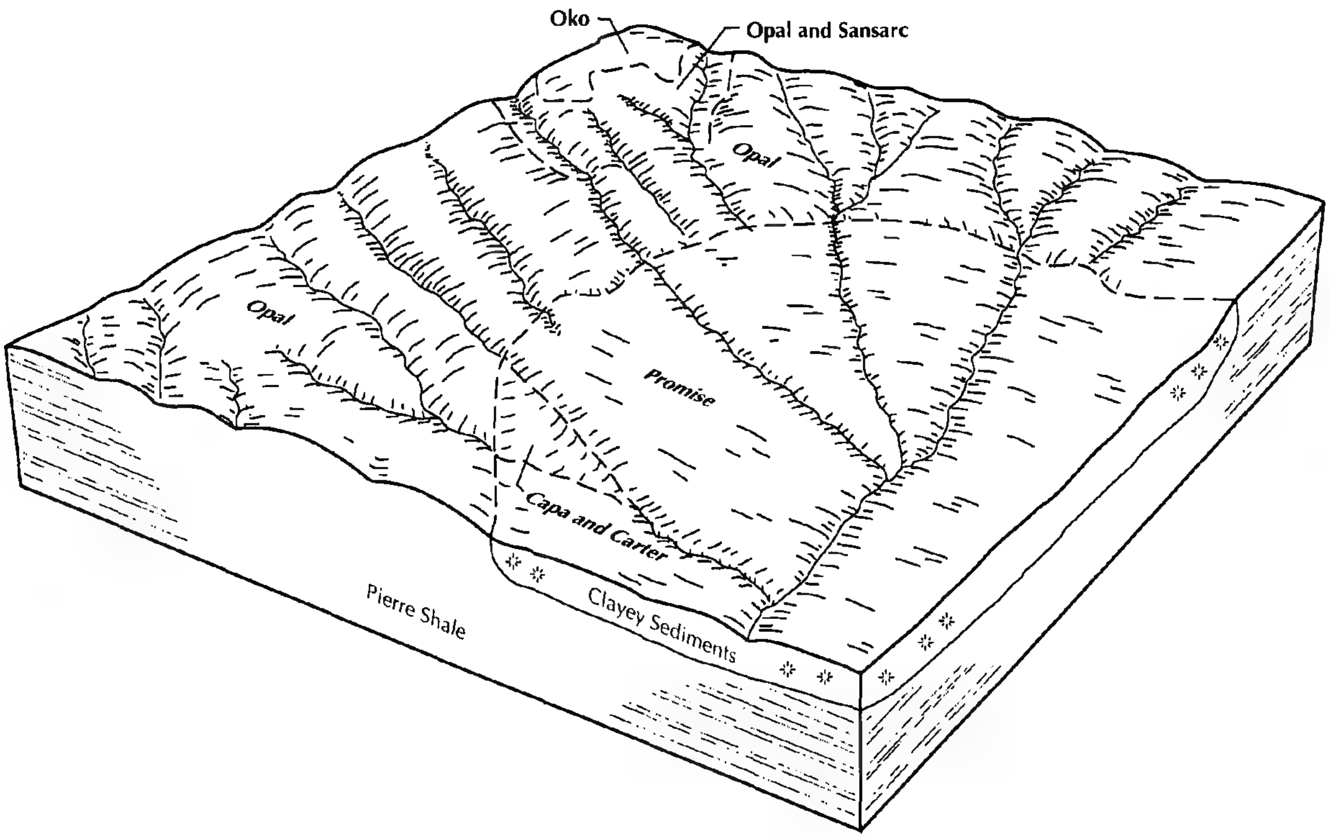

Figure 4.—Typical pattern of soils and parent material in the Opal-Promise association.

depth than the Stickney soils. They are on foot slopes. Jerauld soils are on lower foot slopes. The well drained Glenham soils are deeper over lime than the Java soils. They are on back slopes. The poorly drained Plankinton soils do not have a sodium-affected subsoil, and they are in basins. The moderately well drained Prosper soils do not have a sodium-affected subsoil, and they are on foot slopes.

About 55 percent of this association supports native grasses and is used for grazing. Controlling water erosion and conserving moisture are the main management concerns in areas of the Java and Stickney soils, and wetness is the main management concern in areas of the Hoven soils. Wheat, oats, and alfalfa are the main crops grown. This association is suited to cultivated crops, tame pasture and hay, and range.

Nearly Level to Moderately Sloping, Silty and Loamy Soils on Till Plains and Moraines

These soils dominantly are nearly level and gently sloping but are moderately sloping in places. They make up about 29 percent of the county. About 50 percent of acreage supports native grasses and is used for grazing or hay. Wheat, corn, oats, and alfalfa are the main crops. Controlling erosion and conserving moisture are the main management concerns.

5. Highmore-DeGrey Association

Very deep, well drained and moderately well drained, nearly level and gently sloping, silty soils that formed in silty glacial till and in a silty mantle over loamy glacial till

This association is on glacial till plains that are characterized by long, smooth slopes. The drainage pattern is poorly defined.

This association makes up about 17 percent of the county. It is about 35 percent Highmore soils, 30 percent DeGrey soils, and 35 percent minor soils.

The well drained Highmore soils are on summits and back slopes. Slopes range from 0 to 6 percent. Typically, the surface layer is very dark grayish brown silt loam. The subsoil is dark grayish brown and brown silty clay loam in the upper part and pale brown and light yellowish brown, calcareous silty clay loam in the lower part. The underlying layer is light brownish gray, calcareous silt loam.

The moderately well drained DeGrey soils are on foot slopes. Slopes range from 0 to 6 percent. Typically, the

surface layer is dark gray silt loam. The subsurface layer is gray silt loam. The subsoil is dark grayish brown and grayish brown silty clay in the upper part. It is grayish brown and light brownish gray, calcareous silty clay and silty clay loam that have accumulations of gypsum and other salts in the lower part. The underlying layer is light brownish gray, calcareous clay loam that has accumulations of gypsum and other salts.

Minor in this association are Cavo, Eakin, Raber, and Walke soils. The moderately well drained Cavo soils do not have a silty mantle and are on foot slopes. The well drained Eakin soils are moderately deep over glacial till. They are on shoulder slopes. The well drained Raber soils have more clay in the subsoil than the Highmore soils. They are on shoulder slopes. The moderately well drained Walke soils have a thicker surface soil than the DeGrey soils. They are on foot slopes.

About 50 percent of this association is used as cropland, and about 50 percent supports native grasses used for grazing or hay. Wheat, corn, oats, and alfalfa are the main crops. Controlling water erosion and conserving moisture are the main management concerns. This association is suited to cultivated crops, tame pasture and hay, and range.

6. Eakin-Raber Association

Very deep, well drained, nearly level to moderately sloping, silty and loamy soils that formed in a silty mantle over loamy glacial till and in loamy glacial till

This association is on glacial till plains and moraines that are characterized by broad flats interrupted by drainageways. Slopes dominantly are nearly level and gently sloping but are moderately sloping in some areas. The drainage pattern is poorly defined.

This association makes up about 12 percent of the county. It is about 40 percent Eakin soils, 40 percent Raber soils, and 20 percent minor soils.

The Eakin soils are on summits and back slopes. Slopes range from 0 to 9 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is dark grayish brown silty clay loam in the upper part and light olive brown and light brownish gray, calcareous silty clay loam and clay loam in the lower part. The underlying layer is light brownish gray, calcareous clay loam in the upper part. It is olive gray, calcareous clay loam that has nests of gypsum and other salts in the lower part.

The Raber soils are on shoulder slopes. Slopes range from 0 to 9 percent. Typically, the surface layer is very dark grayish brown loam. The subsoil is dark grayish brown and grayish brown clay loam in the upper part and grayish brown, calcareous clay loam in the lower part. The underlying layer is grayish brown, calcareous clay loam.

Minor in this association are Cavo, Gettys, and Peno soils. The moderately well drained Cavo soils are on foot slopes. Gettys and Peno soils are shallower over lime. They are on shoulder slopes.

About 55 percent of this association supports native grasses and is used for grazing or hay. Controlling water erosion and conserving moisture are the main management concerns. Wheat, corn, oats, and alfalfa are the main crops grown. This association is suited to cultivated crops, tame pasture and hay, and range.

Nearly Level to Steep, Clayey Soils on Plains and Dissected Plains

These soils dominantly are nearly level to moderately steep but are steep in places. They make up about 14 percent of the county. About 60 percent of the acreage is range. Alfalfa, sorghum, wheat, and barley are the main crops. Controlling water erosion and conserving moisture are the main management concerns.

7. Opal-Promise Association

Moderately deep and very deep, well drained, nearly level to moderately steep, clayey soils that formed in residuum and sediments weathered from shale

This association is on plains and dissected plains that are characterized by long, smooth slopes breaking toward hills. Slopes generally are nearly level and gently sloping but are moderately sloping and moderately steep in some areas. The drainage pattern is poorly defined in the less sloping areas and is well defined in the strongly sloping and moderately steep areas.

This association makes up about 11 percent of the county. It is about 30 percent Opal soils, 30 percent Promise soils, and 40 percent minor soils (fig. 4).

The moderately deep Opal soils are on summits and back slopes. Slopes range from 2 to 20 percent. Typically, the surface layer is dark grayish brown clay. The subsoil is dark grayish brown and light brownish gray, calcareous clay. The underlying layer is light brownish gray, calcareous clay. Olive gray, calcareous shale is at a depth of about 28 inches.

The very deep Promise soils are on foot slopes. Slopes range from 0 to 6 percent. Typically, the surface layer is dark grayish brown silty clay. The subsoil is grayish brown, calcareous clay. The underlying layer is grayish brown, calcareous clay, silty clay, and silty clay loam that have accumulations of gypsum.

Minor in this association are Capa, Carter, Oko, and Sansarc soils. The moderately well drained Capa and Carter soils are on lower foot slopes. The deep or very deep Oko soils are on summits and back slopes. The shallow Sansarc soils are on shoulder slopes.

About 50 percent of this association is used as cropland, and about 50 percent supports native grasses used for grazing or hay. Alfalfa, sorghum, wheat, and barley are the main crops, but some corn is also grown.

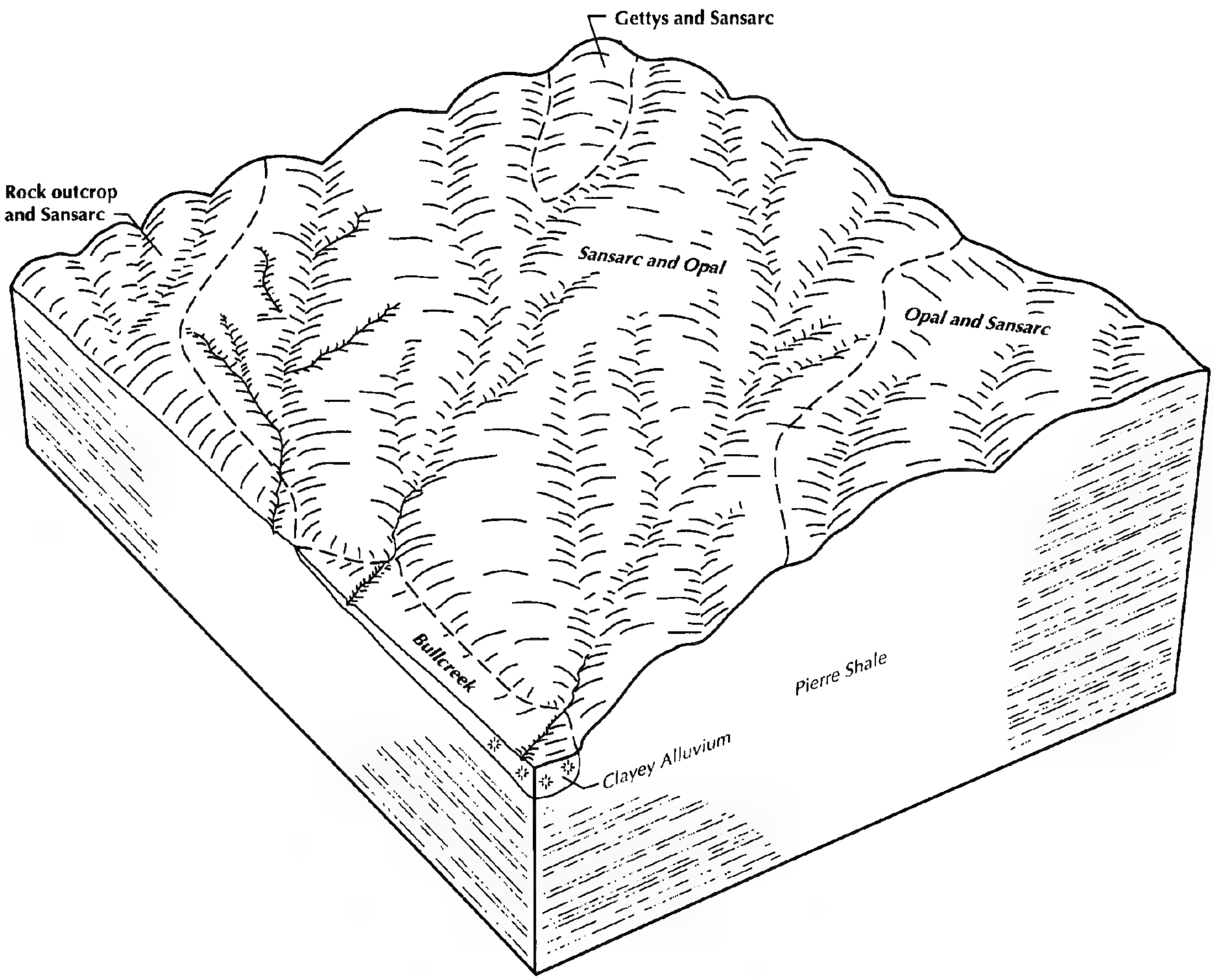

Figure 5.—Typical pattern of soils and parent material in the Sansarc-Opal association.

Controlling erosion and conserving moisture are the main management concerns. This association is suited to range, tame pasture and hay, and cultivated crops.

8. Sansarc-Opal Association

Shallow and moderately deep, well drained, strongly sloping to steep, clayey soils that formed in residuum weathered from shale

This association is on dissected plains that are characterized by steep slopes and deeply entrenched drainageways. Slopes generally are moderately steep and steep but are strongly sloping in some areas. The drainage pattern is well defined.

This association makes up about 3 percent of the county. It is about 60 percent Sansarc soils, 20 percent Opal soils, and 20 percent minor soils (fig. 5).

The shallow Sansarc soils are on shoulder slopes. Slopes range from 9 to 40 percent. Typically, the surface layer is dark grayish brown clay. A transitional layer is grayish brown, calcareous clay. The underlying layer is light brownish gray, calcareous clay. Light brownish gray, calcareous shale is at a depth of about 18 inches.

The moderately deep Opal soils are on back slopes. Slopes range from 9 to 25 percent. Typically, the surface layer is dark grayish brown clay. The subsoil is dark grayish brown and light brownish gray, calcareous clay. The underlying layer is light brownish gray, calcareous clay. Olive gray, calcareous shale is at a depth of about 28 inches.

Minor in this association are Bullcreek and Gettys soils and areas of rock outcrop. The very deep Bullcreek soils are on foot slopes. The very deep Gettys soils have lime closer to the surface than the soils in this association.

They are on shoulder slopes. The rock outcrop consists of shale bedrock. It is on shoulder slopes in areas of the Sansarc soils.

Nearly all areas of this association support native grasses and are used for grazing. Controlling water erosion is the main management concern. This association is suited to range. It generally is unsuited to cultivated crops and tame pasture and hay.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil or soils precedes the map unit name in the soil descriptions. Each description includes general facts about the soil or soils and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Raber loam, 0 to 2 percent slopes, is a phase of the Raber series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Glenham-Java loams, 2 to 6 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

The names of some map units identified on the detailed soil maps of this county do not fully agree with those identified on the maps in the published surveys of Faulk, Hand, Hughes, Potter, and Sully Counties. Differences are the result of variations in the design and composition of the map units or changes and refinements in series concepts.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Slickspots is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

BdA—Bend-Edwin complex, 0 to 4 percent slopes

Composition

Bend and similar soils: 45 to 55 percent
Edwin and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Lake plains
Landform position: Bend—summits and back slopes; Edwin—shoulder slopes
Slope range: Bend—0 to 4 percent; Edwin—0 to 4 percent
Shape of areas: Irregular
Size of areas: 10 to 250 acres

Typical Profile

Bend

Surface layer:
0 to 8 inches—dark gray loam

Subsoil:
8 to 13 inches—grayish brown clay loam
13 to 38 inches—light yellowish brown, calcareous loam

Underlying layer:
38 to 46 inches—light yellowish brown, mottled, calcareous silt loam that is varved with very thin layers of very fine sand to clay
46 to 60 inches—light yellowish brown, mottled, calcareous silt loam that is varved with very thin layers of very fine sand to clay and accumulations of gypsum and other salts

Edwin

Surface layer:
0 to 9 inches—dark grayish brown silt loam

Subsoil:
9 to 27 inches—light yellowish brown, calcareous silt loam

Underlying layer:
27 to 37 inches—pale yellow, calcareous silt loam that has accumulations of gypsum and other salts
37 to 60 inches—pale yellow, calcareous silt loam that is varved with very thin layers of very fine sand to clay and accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Bend—well drained; Edwin—well drained
Depth to bedrock: Bend—very deep; Edwin—very deep
Depth to contrasting parent material: Bend—more than 60 inches; Edwin—more than 60 inches
Depth to a high water table: Bend—more than 6 feet; Edwin—more than 6 feet
Flooding: Bend—none; Edwin—none
Ponding: Bend—none; Edwin—none
Permeability: Bend—moderate; Edwin—moderate
Available water capacity: Bend—high; Edwin—high
Organic matter content: Bend—moderate; Edwin—moderate
Rate of surface runoff: Bend—low; Edwin—low

Inclusions

Contrasting inclusions:
• Henkin soils, which have more sand throughout the profile than Bend and Edwin soils and are on back slopes
• The poorly drained Plankinton and Tetonka soils in basins
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
Similar inclusions:
• Soils that do not have stratified material within a depth of 40 inches
• Soils that have more clay in the subsoil and are darker to a greater depth than the Bend soil
• Soils that are similar to the Edwin soil and have lime at or near the surface
• Soils that have more clay in the subsoil than the Edwin soil

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.
• Contour farming and grassed waterways help control water erosion, although the slopes in some areas are too short or too irregular for contouring.

Interpretive Groups

Land capability classification: Bend—IIe-2; Edwin—IIIe-12
Range site: Bend—Silty; Edwin—Thin Upland
Windbreak suitability group: Bend—3; Edwin—8
Pasture suitability group: Bend—F; Edwin—G

BkE—Betts-Java loams, 9 to 20 percent slopes

Composition

Betts and similar soils: 50 to 60 percent
Java and similar soils: 35 to 40 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Moraines
Landform position: Betts—shoulder slopes; Java—back slopes
Slope range: Betts—12 to 20 percent; Java—9 to 20 percent
Shape of areas: Irregular
Size of areas: 10 to 175 acres

Typical Profile

Betts

Surface layer:
0 to 2 inches—dark gray, calcareous loam

Subsoil:
2 to 10 inches—light brownish gray, calcareous clay loam
10 to 18 inches—light yellowish brown, calcareous clay loam
18 to 50 inches—light brownish gray, calcareous clay loam

Underlying layer:
50 to 60 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Betts—well drained; Java—well drained
Depth to bedrock: Betts—very deep; Java—very deep
Depth to contrasting parent material: Betts—more than 60 inches; Java—more than 60 inches
Depth to a high water table: Betts—more than 6 feet; Java—more than 6 feet
Flooding: Betts—none; Java—none
Ponding: Betts—none; Java—none
Permeability: Betts—moderately slow; Java—moderately slow
Available water capacity: Betts—high; Java—high
Organic matter content: Betts—moderately low; Java—moderately low
Rate of surface runoff: Betts—high; Java—high
Other properties: The Betts soil has a high content of lime; some areas have scattered stones on the surface.

Inclusions

Contrasting inclusions:
- The moderately well drained Prosper soils on foot slopes
- The excessively drained Talmo soils on shoulder slopes

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Betts—water erosion and the high content of lime, which adversely affects the availability of plant nutrients; Java—water erosion
Management measures:
- Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Betts—VIe-3; Java—VIe-3
Range site: Betts—Thin Upland; Java—Silty
Windbreak suitability group: Betts—10; Java—10
Pasture suitability group: Betts—NS; Java—G

BkF—Betts-Java loams, 20 to 40 percent slopes

Composition

Betts and similar soils: 50 to 60 percent
Java and similar soils: 35 to 40 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Moraines
Landform position: Betts—shoulder slopes; Java—back slopes
Slope range: Betts—20 to 40 percent; Java—20 to 40 percent
Shape of areas: Irregular
Size of areas: 20 to 300 acres

Typical Profile

Betts

Surface layer:
0 to 2 inches—dark gray, calcareous loam

Subsoil:
2 to 10 inches—light brownish gray, calcareous clay loam
10 to 18 inches—light yellowish brown, calcareous clay loam
18 to 50 inches—light brownish gray, calcareous clay loam

Underlying layer:
50 to 60 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Betts—well drained; Java—well drained
Depth to bedrock: Betts—very deep; Java—very deep
Depth to contrasting parent material: Betts—more than 60 inches; Java—more than 60 inches

Depth to a high water table: Betts—more than 6 feet; Java—more than 6 feet
Flooding: Betts—none; Java—none
Ponding: Betts—none; Java—none
Permeability: Betts—moderately slow; Java—moderately slow
Available water capacity: Betts—high; Java—high
Organic matter content: Betts—moderately low; Java—moderately low
Rate of surface runoff: Betts—very high; Java—very high
Other properties: The Betts soil has a high content of lime; some areas have scattered stones on the surface.

Inclusions

Contrasting inclusions:
- The moderately well drained Prosper soils on foot slopes
- The excessively drained Talmo soils on shoulder slopes

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Betts—water erosion, the high content of lime (which adversely affects the availability of plant nutrients), and the slope; Java—water erosion and slope
Management measures:
- Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Betts—VIIe-3; Java—VIIe-3
Range site: Betts—Thin Upland; Java—Silty
Windbreak suitability group: Betts—10; Java—10
Pasture suitability group: Betts—NS; Java—NS

Bn—Bon loam, channeled

Composition

Bon and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Flood plains
Landform position: Low flood plains
Slope range: 0 to 1 percent
Shape of areas: Elongated
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 12 inches—very dark gray, calcareous loam
12 to 18 inches—very dark gray, calcareous silt loam
18 to 36 inches—dark gray, calcareous loam
36 to 45 inches—dark grayish brown, calcareous loam

Underlying layer:
45 to 60 inches—dark gray, calcareous, stratified loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: 3 to 5 feet
Flooding: Occasional for brief periods
Ponding: None
Permeability: Moderate
Available water capacity: High
Organic matter content: High
Rate of surface runoff: Very low
Other properties: The soil generally is dissected by a meandering channel.

Inclusions

Contrasting inclusions:
- Durrstein soils, which have a sodium-affected subsoil and are on low flood plains
- Wendte soils, which have more clay throughout the profile than the Bon soil and are on low flood plains

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Flooding, the high content of lime (which adversely affects the availability of plant nutrients), and meandering channels that limit cultivation
Management measures:
- Proper grazing management helps to maintain plant vigor and control streambank erosion.

Interpretive Groups

Land capability classification: VIw-1
Range site: Loamy Overflow
Windbreak suitability group: 1
Pasture suitability group: NS

BuA—Bullcreek clay, 0 to 6 percent slopes

Composition

Bullcreek and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Fans
Landform position: Foot slopes
Slope range: 0 to 6 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 200 acres

Typical Profile

Surface layer:
0 to 2 inches—dark gray, calcareous clay

Subsoil:
2 to 8 inches—dark grayish brown, calcareous clay
8 to 13 inches—dark grayish brown, calcareous clay that has accumulations of gypsum and other salts
13 to 23 inches—grayish brown, calcareous clay that has accumulations of gypsum and other salts

Underlying layer:
23 to 60 inches—grayish brown, calcareous clay that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: More than 6 feet
Flooding: Rare
Ponding: None
Permeability: Very slow
Available water capacity: Moderate
Organic matter content: Moderate
Rate of surface runoff: High

Inclusions

Contrasting inclusions:
- The moderately deep Opal soils on adjacent back slopes
- The well drained Promise soils on foot slopes
- Wendte soils, which have less clay throughout the profile than the Bullcreek soil and are on low, adjacent flood plains
- Slickspots, which have visible salts above a depth of 6 inches and are on lower foot slopes

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Wind and water erosion, a slow water intake rate, and a high content of salts
Management measures:
- Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.
- Restricting grazing during wet periods helps to minimize soil compaction.

Interpretive Groups

Land capability classification: VIs-5
Range site: Dense Clay
Windbreak suitability group: 10
Pasture suitability group: NS

CcA—Capa-Carter silt loams, 0 to 4 percent slopes

Composition

Capa and similar soils: 50 to 60 percent
Carter and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Plains
Landform position: Capa—lower foot slopes; Carter—foot slopes
Slope range: Capa—0 to 4 percent; Carter—0 to 4 percent
Shape of areas: Irregular
Size of areas: 5 to 1,000 acres

Typical Profile

Capa

Surface layer:
0 to 2 inches—grayish brown silt loam

Subsoil:
2 to 8 inches—dark grayish brown clay
8 to 22 inches—grayish brown, calcareous clay that has accumulations of gypsum and other salts

Underlying layer:
22 to 60 inches—grayish brown, calcareous clay that has accumulations of gypsum and other salts

Carter

Surface layer:
0 to 6 inches—dark gray silt loam

Subsoil:
6 to 18 inches—dark gray clay
18 to 24 inches—grayish brown, calcareous clay
24 to 32 inches—grayish brown, calcareous silty clay that has accumulations of gypsum and other salts

Underlying layer:
32 to 60 inches—light brownish gray, calcareous silty clay that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Capa—moderately well drained; Carter—well drained
Depth to bedrock: Capa—very deep; Carter—very deep
Depth to contrasting parent material: Capa—more than 60 inches; Carter—more than 60 inches
Depth to a high water table: Capa—3.5 to 5 feet; Carter—more than 6 feet
Flooding: Capa—none; Carter—none
Ponding: Capa—none; Carter—none
Permeability: Capa—very slow; Carter—very slow
Available water capacity: Capa—moderate; Carter—moderate
Organic matter content: Capa—moderately low; Carter—moderate
Rate of surface runoff: Capa—medium; Carter—medium
Other properties: The Capa soil has a sodium-affected subsoil and a high content of salts.

Inclusions

Contrasting inclusions:
- The poorly drained Hoven soils in basins
- The well drained Promise soils on adjacent foot slopes
- Slickspots, which have visible salts above a depth of 6 inches and are on lower foot slopes

Similar inclusions:
- Soils that are similar to the Capa soil and do not have salts within a depth of 16 inches

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: The sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots, and the slow water intake rate
Management measures:
- Proper grazing management helps to maintain plant vigor.

Interpretive Groups

Land capability classification: Capa—VIs-1; Carter—IVs-2
Range site: Capa—Thin Claypan; Carter—Claypan
Windbreak suitability group: Capa—10; Carter—9
Pasture suitability group: Capa—NS; Carter—C

ClA—Capa-Slickspots complex, 0 to 4 percent slopes

Composition

Capa and similar soils: 55 to 65 percent
Slickspots: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Plains (fig. 6)
Landform position: Capa—foot slopes; Slickspots—lower foot slopes
Slope range: Capa—0 to 4 percent; Slickspots—0 to 4 percent
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Capa

Surface layer:
0 to 2 inches—grayish brown silt loam

Subsoil:
2 to 8 inches—dark grayish brown clay
8 to 22 inches—grayish brown, calcareous clay that has accumulations of gypsum and other salts

Underlying layer:
22 to 60 inches—grayish brown, calcareous clay that has accumulations of gypsum and other salts

Characteristics of Slickspots

- A light gray, dispersed crust and dense, massive underlying material
- Accumulations of visible salts at or near the surface
- Barren or nearly barren of vegetation

Soil Properties and Qualities

Drainage class: Capa—moderately well drained; Slickspots—moderately well drained
Depth to bedrock: Capa—very deep; Slickspots—very deep
Depth to contrasting parent material: Capa—more than 60 inches; Slickspots—more than 60 inches
Depth to a high water table: Capa—3.5 to 5 feet; Slickspots—3.0 to 5 feet
Flooding: Capa—none; Slickspots—none
Ponding: Capa—none; Slickspots—none
Permeability: Capa—very slow; Slickspots—very slow
Available water capacity: Capa—moderate; Slickspots—low
Organic matter content: Capa—moderately low; Slickspots—low
Rate of surface runoff: Capa—medium; Slickspots—medium
Other properties: The Capa soil and Slickspots have a sodium-affected subsoil and a high content of salts.

Inclusions

Contrasting inclusions:
- Carter soils, which do not have a sodium-affected subsoil and are on foot slopes

Figure 6.—An area of Capa-Slickspots complex, 0 to 4 percent slopes.

- The poorly drained Kolls soils in basins
- Opal and Promise soils, which do not have a sodium-affected subsoil and are on higher parts of the landscape

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited

Management concerns: Capa—the sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots, and the slow water intake rate; Slickspots—the sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), the slow water intake rate, the low available water capacity, a high concentration of salts, and wind erosion

Management measures:

- Proper grazing management helps to maintain the vigor of plants, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Capa—VIs-1; Slickspots—VIIIs-2

Range site: Capa—Thin Claypan; Slickspots—Not assigned

Windbreak suitability group: Capa—10; Slickspots—10

Pasture suitability group: Capa—NS; Slickspots—NS

CpA—Carter-Promise complex, 0 to 3 percent slopes

Composition

Carter and similar soils: 45 to 55 percent
Promise and similar soils: 40 to 45 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Plains
Landform position: Carter—lower foot slopes; Promise—foot slopes
Slope range: Carter—0 to 3 percent; Promise—0 to 3 percent
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Carter

Surface layer:
0 to 6 inches—dark gray silt loam

Subsoil:
6 to 18 inches—dark gray clay
18 to 24 inches—grayish brown, calcareous clay
24 to 32 inches—grayish brown, calcareous silty clay that has accumulations of gypsum and other salts

Underlying layer:
32 to 60 inches—light brownish gray, calcareous silty clay that has accumulations of gypsum and other salts

Promise

Surface layer:
0 to 8 inches—dark grayish brown silty clay

Subsoil:
8 to 27 inches—grayish brown, calcareous clay

Underlying layer:
27 to 43 inches—grayish brown, calcareous clay that has accumulations of gypsum in the lower part
43 to 60 inches—grayish brown, calcareous silty clay and silty clay loam that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Carter—well drained; Promise—well drained
Depth to bedrock: Carter—very deep; Promise—deep or very deep
Depth to contrasting parent material: Carter—more than 60 inches; Promise—40 to more than 60 inches over shale
Depth to a high water table: Carter—more than 6 feet; Promise—more than 6 feet
Flooding: Carter—none; Promise—none
Ponding: Carter—none; Promise—none
Permeability: Carter—very slow; Promise—very slow
Available water capacity: Carter—moderate; Promise—moderate
Organic matter content: Carter—moderate; Promise—moderate
Rate of surface runoff: Carter—medium; Promise—medium

Inclusions

Contrasting inclusions:
- Capa soils, which have a sodium-affected subsoil and are on lower foot slopes
- The poorly drained Hoven soils in basins
- The moderately deep Opal soils on the higher parts of the landscape

Similar inclusions:
- Soils that have a surface layer of clay

Use and Management

Cropland

Main crops: Wheat, sorghum, sunflowers, barley, and alfalfa
Suitability for cropland: Poorly suited
Management concerns: Carter—slow water intake rate; Promise—wind erosion and a slow water intake rate
Management measures:
- Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
- Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Carter—IVs-2; Promise—IIIs-3
Range site: Carter—Claypan; Promise—Clayey
Windbreak suitability group: Carter—9; Promise—4
Pasture suitability group: Carter—C; Promise—I

CrA—Cavo-Jerauld loams, 0 to 4 percent slopes

Composition

Cavo and similar soils: 50 to 60 percent
Jerauld and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains

Landform position: Cavo—foot slopes; Jerauld—lower foot slopes
Slope range: Cavo—0 to 4 percent; Jerauld—0 to 4 percent
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Cavo

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsurface layer:
5 to 7 inches—grayish brown loam

Subsoil:
7 to 18 inches—dark grayish brown clay loam
18 to 29 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts

Underlying layer:
29 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of gypsum and other salts

Jerauld

Surface layer:
0 to 2 inches—grayish brown loam

Subsurface layer:
2 to 5 inches—gray loam

Subsoil:
5 to 10 inches—dark grayish brown clay loam
10 to 17 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts
17 to 33 inches—light brownish gray, calcareous clay loam that has accumulations of gypsum and other salts

Underlying layer:
33 to 60 inches—light yellowish brown, calcareous clay loam that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Cavo—moderately well drained; Jerauld—moderately well drained
Depth to bedrock: Cavo—very deep; Jerauld—very deep
Depth to contrasting parent material: Cavo—more than 60 inches; Jerauld—more than 60 inches
Depth to a high water table: Cavo—3.5 to 5 feet; Jerauld—3.5 to 5 feet
Flooding: Cavo—none; Jerauld—none
Ponding: Cavo—none; Jerauld—none
Permeability: Cavo—very slow; Jerauld—very slow
Available water capacity: Cavo—moderate; Jerauld—moderate
Organic matter content: Cavo—moderately low; Jerauld—moderately low
Rate of surface runoff: Cavo—medium; Jerauld—medium
Other properties: Both soils have a sodium-affected subsoil; the Jerauld soil has a high content of salts.

Inclusions

Contrasting inclusions:
• The poorly drained Hoven soils in basins
• Slickspots, which have visible salts above a depth of 6 inches and are on lower foot slopes

Use and Management

Cropland

Main crops: Wheat, sorghum, barley, and alfalfa
Suitability for cropland: Cavo—poorly suited; Jerauld—generally unsuited
Management concerns: The sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), the slow water intake rate, and water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Cavo—IVs-2; Jerauld—VIs-1
Range site: Cavo—Claypan; Jerauld—Thin Claypan
Windbreak suitability group: Cavo—9; Jerauld—10
Pasture suitability group: Cavo—C; Jerauld—NS

Cs—Cavo-Stickney loams

Composition

Cavo and similar soils: 50 to 60 percent
Stickney and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Cavo—lower foot slopes; Stickney—foot slopes
Slope range: Cavo—0 to 2 percent; Stickney—0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Cavo

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsurface layer:
5 to 7 inches—grayish brown loam

Subsoil:
7 to 18 inches—dark grayish brown clay loam
18 to 29 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts

Underlying layer:
29 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of gypsum and other salts

Stickney

Surface layer:
0 to 6 inches—dark gray loam

Subsurface layer:
6 to 11 inches—gray silty clay loam

Transitional layer:
11 to 14 inches—gray and light brownish gray silty clay loam

Subsoil:
14 to 28 inches—gray silty clay
28 to 32 inches—grayish brown, calcareous silty clay
32 to 45 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of salts

Underlying layer:
45 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of salts

Soil Properties and Qualities

Drainage class: Cavo—moderately well drained; Stickney—moderately well drained
Depth to bedrock: Cavo—very deep; Stickney—very deep
Depth to contrasting parent material: Cavo—more than 60 inches; Stickney—more than 60 inches
Depth to a high water table: Cavo—3.5 to 5 feet; Stickney—3.5 to 5 feet
Flooding: Cavo—none; Stickney—none
Ponding: Cavo—none; Stickney—none
Permeability: Cavo—very slow; Stickney—slow
Available water capacity: Cavo—moderate; Stickney—high
Organic matter content: Cavo—moderately low; Stickney—moderate
Rate of surface runoff: Cavo—medium; Stickney—medium
Other properties: Both soils have a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• The poorly drained Hoven and Plankinton soils in basins
• The well drained Java and Peno soils on higher parts of the landscape
• Jerauld soils, which have salts within a depth of 16 inches and are on lower foot slopes
Similar inclusions:
• Soils that do not have glacial till within a depth of 20 inches

Use and Management

Cropland

Main crops: Wheat, sorghum, barley, and alfalfa
Suitability for cropland: Poorly suited
Management concerns: The sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots, and the slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Cavo—IVs-2; Stickney—IIIs-1
Range site: Cavo—Claypan; Stickney—Clayey
Windbreak suitability group: Cavo—9; Stickney—4
Pasture suitability group: Cavo—C; Stickney—E

Df—DeGrey-Walke silt loams

Composition

DeGrey and similar soils: 50 to 60 percent
Walke and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains (fig. 7)
Landform position: DeGrey—lower foot slopes; Walke—foot slopes
Slope range: DeGrey—0 to 2 percent; Walke—0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 150 acres

Figure 7.—Hay in an area of DeGrey-Walke silt loams.

Typical Profile

DeGrey

Surface layer:
0 to 5 inches—dark gray silt loam

Subsurface layer:
5 to 8 inches—gray silt loam

Subsoil:
8 to 13 inches—dark grayish brown silty clay
13 to 18 inches—grayish brown silty clay
18 to 29 inches—grayish brown, calcareous silty clay that has accumulations of gypsum and other salts
29 to 39 inches—light brownish gray, calcareous silty clay loam that has accumulations of gypsum and other salts

Underlying layer:
39 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of gypsum and other salts

Walke

Surface layer:
0 to 7 inches—dark grayish brown silt loam

Transitional layer:
7 to 10 inches—grayish brown and gray silty clay loam

Subsoil:
10 to 19 inches—dark grayish brown silty clay
19 to 33 inches—light brownish gray, calcareous silty clay loam
33 to 47 inches—light brownish gray, calcareous clay loam

Underlying layer:
47 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: DeGrey—moderately well drained; Walke—moderately well drained
Depth to bedrock: DeGrey—very deep; Walke—very deep
Depth to contrasting parent material: DeGrey—20 to 40

inches over glacial till; Walke—20 to 40 inches over glacial till
Depth to a high water table: DeGrey—3.5 to 5 feet; Walke—3.5 to 5 feet
Flooding: DeGrey—none; Walke—none
Ponding: DeGrey—none; Walke—none
Permeability: DeGrey—very slow; Walke—slow
Available water capacity: DeGrey—high; Walke—high
Organic matter content: DeGrey—moderate; Walke—moderate
Rate of surface runoff: DeGrey—medium; Walke—medium
Other properties: Both soils have a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• The well drained Highmore and Raber soils on higher parts of the landscape
• The poorly drained Hoven and Plankinton soils in basins
• Jerauld soils, which have salts within a depth of 16 inches and are on foot slopes
Similar inclusions:
• Soils that have glacial till within a depth of 20 inches

Use and Management

Cropland

Main crops: Wheat, sorghum, barley, and alfalfa
Suitability for cropland: Poorly suited
Management concerns: The sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots, and the slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help conserve moisture, control erosion, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: DeGrey—IVs-2; Walke—IIIs-1
Range site: DeGrey—Claypan; Walke—Clayey
Windbreak suitability group: DeGrey—9; Walke—4
Pasture suitability group: DeGrey—C; Walke—E

DnB—Delmont-Oahe loams, 2 to 6 percent slopes

Composition

Delmont and similar soils: 55 to 65 percent
Oahe and similar soils: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Outwash plains
Landform position: Delmont—shoulder slopes; Oahe—back slopes
Slope range: Delmont—2 to 6 percent; Oahe—2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 300 acres

Typical Profile

Delmont

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 14 inches—dark grayish brown loam
14 to 17 inches—dark grayish brown, calcareous sandy loam

Underlying layer:
17 to 25 inches—olive gray, calcareous very gravelly loamy sand
25 to 60 inches—brown, calcareous very gravelly sand

Oahe

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 17 inches—dark grayish brown loam
17 to 23 inches—grayish brown loam
23 to 33 inches—grayish brown, calcareous loam

Underlying layer:
33 to 60 inches—yellowish brown, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Delmont—somewhat excessively drained; Oahe—well drained
Depth to bedrock: Delmont—very deep; Oahe—very deep
Depth to contrasting parent material: Delmont—14 to 20 inches over sand and gravel; Oahe—20 to 40 inches over sand and gravel
Depth to a high water table: Delmont—more than 6 feet; Oahe—more than 6 feet
Flooding: Delmont—none; Oahe—none
Ponding: Delmont—none; Oahe—none
Permeability: Delmont—moderate in the subsoil and very rapid in the underlying layer; Oahe—moderate in the subsoil and very rapid in the underlying layer
Available water capacity: Delmont—low; Oahe—moderate
Organic matter content: Delmont—moderate; Oahe—moderate

Rate of surface runoff: Delmont—medium; Oahe—medium

Inclusions

Contrasting inclusions:
• The poorly drained Hoven and Plankinton soils in basins
• The moderately well drained Jerauld soils on foot slopes
• The moderately well drained Prosper soils on foot slopes
• The excessively drained Talmo soils on shoulder slopes
Similar inclusions:
• Soils that are similar to the Oahe soil but do not have gravelly material within a depth of 40 inches

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Poorly suited
Management concerns: Delmont—water erosion and the low available water capacity; Oahe—water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.

Interpretive Groups

Land capability classification: Delmont—IVe-6; Oahe—IIIe-6
Range site: Delmont—Shallow To Gravel; Oahe—Silty
Windbreak suitability group: Delmont—6; Oahe—6
Pasture suitability group: Delmont—D2; Oahe—D1

Du—Durrstein-Egas complex

Composition

Durrstein and similar soils: 55 to 60 percent
Egas and similar soils: 25 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains (fig. 8)
Landform position: Durrstein—low flood plains; Egas—low flood plains
Slope range: Durrstein—0 to 1 percent; Egas—0 to 1 percent
Shape of areas: Elongated
Size of areas: 5 to 400 acres

Typical Profile

Durrstein

Surface layer:
0 to 2 inches—dark gray silt loam

Subsurface layer:
2 to 6 inches—gray silt loam

Subsoil:
6 to 11 inches—dark gray silty clay
11 to 19 inches—dark gray, mottled, calcareous silty clay that has accumulations of salts
19 to 50 inches—light brownish gray, mottled, calcareous silty clay that has accumulations of salts
50 to 60 inches—gray, calcareous silty clay

Underlying layer:

Egas

Surface layer:
0 to 4 inches—dark gray silty clay

Transitional layer:
4 to 24 inches—dark gray and dark grayish brown silty clay loam that has accumulations of gypsum and other salts and is calcareous in the lower part

Underlying layer:
24 to 60 inches—light brownish gray, mottled, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Durrstein—poorly drained; Egas—poorly drained
Depth to bedrock: Durrstein—very deep; Egas—very deep
Depth to contrasting parent material: Durrstein—more than 60 inches; Egas—more than 60 inches
Depth to a high water table: Durrstein—0 to 1.5 feet; Egas—0 to 1.5 feet
Flooding: Durrstein—occasional for brief periods; Egas—occasional for brief periods
Ponding: Durrstein—none; Egas—none
Permeability: Durrstein—very slow; Egas—slow
Available water capacity: Durrstein—moderate; Egas—moderate
Organic matter content: Durrstein—moderately low; Egas—moderate
Rate of surface runoff: Durrstein—low; Egas—low
Other properties: The Durrstein soil has a sodium-affected subsoil and a high content of salts; the Egas soil has a high content of salts.

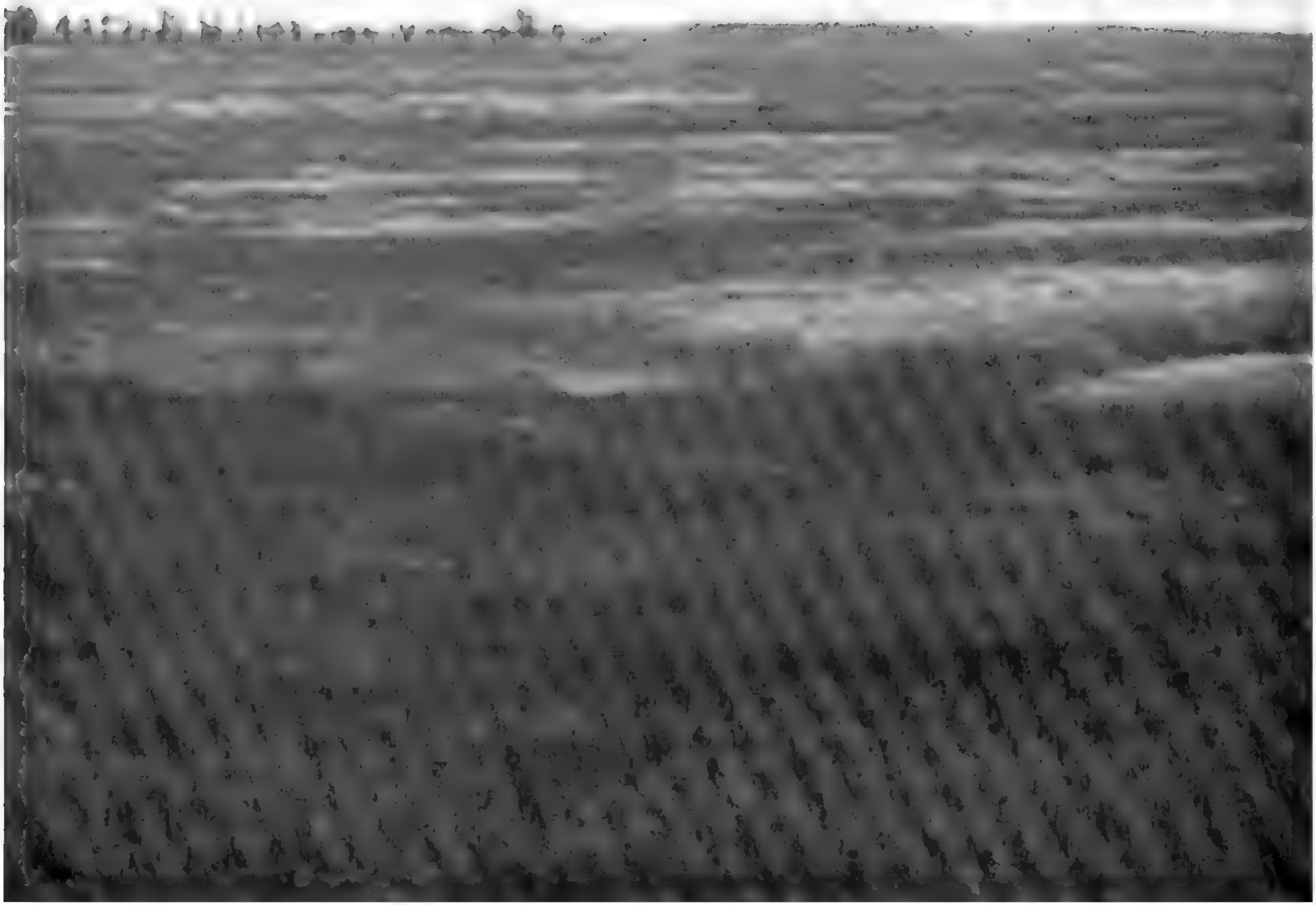

Figure 8.—Native grassland in an area of Durrstein-Egas complex.

Inclusions

Contrasting inclusions:

• The moderately well drained, sodium-affected Cavo soils on foot slopes
• The moderately well drained, sodium-affected Jerauld soils on lower foot slopes and on lower back slopes
• The poorly drained Hoven soils in basins

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Durrstein—wetness, the sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), the slow water intake rate, and soil compaction; Egas—wetness, a high content of salt, soil compaction, and wind erosion
Management measures:
• Proper grazing management helps to maintain plant vigor.
• Restricting grazing during wet periods helps to minimize soil compaction.

Interpretive Groups

Land capability classification: Durrstein—VIs-6; Egas—VIs-6
Range site: Durrstein—Saline Lowland; Egas—Saline Lowland
Windbreak suitability group: Durrstein—10; Egas—10
Pasture suitability group: Durrstein—J; Egas—J

EpC—Eakin-Peno complex, 6 to 9 percent slopes

Composition

Eakin and similar soils: 60 to 70 percent
Peno and similar soils: 25 to 30 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Moraines
Landform position: Eakin—back slopes; Peno—shoulder slopes
Slope range: Eakin—6 to 9 percent; Peno—6 to 9 percent
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Eakin

Surface layer:
0 to 7 inches—dark grayish brown silt loam

Subsoil:
7 to 14 inches—dark grayish brown silty clay loam
14 to 29 inches—light olive brown, calcareous silty clay loam
29 to 45 inches—light brownish gray, calcareous clay loam

Underlying layer:
45 to 53 inches—light brownish gray, calcareous clay loam
53 to 60 inches—olive gray,

Peno

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 9 inches—dark grayish brown clay loam
9 to 45 inches—grayish brown, calcareous clay loam

Underlying layer:
45 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Eakin—well drained; Peno—well drained
Depth to bedrock: Eakin—very deep; Peno—very deep
Depth to contrasting parent material: Eakin—20 to 40 inches over loamy glacial till; Peno—more than 60 inches
Depth to a high water table: Eakin—more than 6 feet; Peno—more than 6 feet
Flooding: Eakin—none; Peno—none
Ponding: Eakin—none; Peno—none
Permeability: Eakin—moderately slow; Peno—slow
Available water capacity: Eakin—high; Peno—moderate
Organic matter content: Eakin—moderate; Peno—moderate
Rate of surface runoff: Eakin—medium; Peno—high

Inclusions

Contrasting inclusions:
• The moderately well drained DeGrey soils, which have a sodium-affected subsoil and are on lower foot slopes
• The moderately well drained Walke soils, which have a sodium-affected subsoil and are on foot slopes
• The moderately well drained Onita soils on foot slopes
• The poorly drained Hoven and Plankinton soils in basins
Similar inclusions:
• Soils that are similar to the Eakin soil but do not have glacial till within a depth of 40 inches
• Soils that are similar to the Peno soil and have lime at or near the surface
• Areas of Peno soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Wheat, corn, oats, sunflowers, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: Eakin—water erosion; Peno—water erosion and the slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.
• Contour farming, terraces, and grassed waterways help to control water erosion, although the slopes in some areas are too short or too irregular for contouring and terracing.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration in areas of the Peno soil.

Interpretive Groups

Land capability classification: Eakin—IIIe-1; Peno—IVe-3
Range site: Eakin—Silty; Peno—Clayey
Windbreak suitability group: Eakin—3; Peno—4
Pasture suitability group: Eakin—F; Peno—F

ErA—Eakin-Raber complex, 0 to 2 percent slopes

Composition

Eakin and similar soils: 60 to 70 percent
Raber and similar soils: 20 to 30 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Eakin—summits and back slopes; Raber—shoulder slopes
Slope range: Eakin—0 to 2 percent; Raber—0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 200 acres

Typical Profile

Eakin

Surface layer:
0 to 7 inches—dark grayish brown silt loam

Subsoil:
7 to 14 inches—dark grayish brown silty clay loam
14 to 29 inches—light olive brown, calcareous silty clay loam
29 to 45 inches—light brownish gray, calcareous clay loam

Underlying layer:
45 to 53 inches—light brownish gray, calcareous clay loam
53 to 60 inches—olive gray, calcareous clay loam

Raber

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 10 inches—dark grayish brown clay loam
10 to 17 inches—grayish brown clay loam
17 to 41 inches—grayish brown, calcareous clay loam

Underlying layer:
41 to 60 inches—grayish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Eakin—well drained; Raber—well drained
Depth to bedrock: Eakin—very deep; Raber—very deep
Depth to contrasting parent material: Eakin—20 to 40 inches over loamy glacial till; Raber—more than 60 inches
Depth to a high water table: Eakin—more than 6 feet; Raber—more than 6 feet
Flooding: Eakin—none; Raber—none
Ponding: Eakin—none; Raber—none
Permeability: Eakin—moderately slow; Raber—slow
Available water capacity: Eakin—high; Raber—high
Organic matter content: Eakin—moderate; Raber—moderate
Rate of surface runoff: Eakin—low; Raber—medium

Inclusions

Contrasting inclusions:
• The moderately well drained DeGrey soils, which have a sodium-affected subsoil and are on lower foot slopes
• The moderately well drained Walke soils, which have a sodium-affected subsoil and are on foot slopes
• The moderately well drained Onita soils on foot slopes
• Peno soils, which have lime within a depth of 12 inches and are on shoulder slopes
• The poorly drained Hoven and Plankinton soils in basins
Similar inclusions:
• Soils that are similar to the Eakin soil but do not have glacial till within a depth of 40 inches

Use and Management

Cropland

Main crops: Wheat, corn, oats, sunflowers, and alfalfa
Suitability for cropland: Well suited
Management concerns: Eakin—conserving moisture; Raber—the slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Eakin—IIs-1; Raber—IIc-2
Range site: Eakin—Silty; Raber—Clayey
Windbreak suitability group: Eakin—3; Raber—4
Pasture suitability group: Eakin—F; Raber—E

ErB—Eakin-Raber complex, 2 to 6 percent slopes

Composition

Eakin and similar soils: 50 to 60 percent
Raber and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Eakin—summits and back slopes; Raber—shoulder slopes
Slope range: Eakin—2 to 6 percent; Raber—2 to 6 percent
Shape of areas: Irregular
Size of areas: 10 to 200 acres

Typical Profile

Eakin

Surface layer:
0 to 7 inches—dark grayish brown silt loam

Subsoil:
7 to 14 inches—dark grayish brown silty clay loam
14 to 29 inches—light olive brown, calcareous silty clay loam
29 to 45 inches—light brownish gray, calcareous clay loam

Underlying layer:
45 to 53 inches—light brownish gray, calcareous clay loam
53 to 60 inches—olive gray, calcareous clay loam

Raber

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 10 inches—dark grayish brown clay loam
10 to 17 inches—grayish brown clay loam
17 to 41 inches—grayish brown, calcareous clay loam

Underlying layer:
41 to 60 inches—grayish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Eakin—well drained; Raber—well drained
Depth to bedrock: Eakin—very deep; Raber—very deep
Depth to contrasting parent material: Eakin—20 to 40 inches over loamy glacial till; Raber—more than 60 inches
Depth to a high water table: Eakin—more than 6 feet; Raber—more than 6 feet
Flooding: Eakin—none; Raber—none
Ponding: Eakin—none; Raber—none
Permeability: Eakin—moderately slow; Raber—slow
Available water capacity: Eakin—high; Raber—high
Organic matter content: Eakin—moderate; Raber—moderate
Rate of surface runoff: Eakin—medium; Raber—high

Inclusions

Contrasting inclusions:
• The moderately well drained DeGrey soils, which have a sodium-affected subsoil and are on lower foot slopes
• The moderately well drained Walke soils, which have a sodium-affected subsoil and are on foot slopes
• The moderately well drained Onita soils on foot slopes
• Peno soils, which have lime within a depth of 12 inches and are on shoulder slopes
• The poorly drained Hoven and Plankinton soils in basins

Similar inclusions:
• Soils that are similar to the Eakin soil but do not have glacial till within a depth of 40 inches
• Areas of Raber soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Wheat, corn, oats, sunflowers, and alfalfa
Suitability for cropland: Well suited
Management concerns: Eakin—water erosion; Raber—water erosion and the slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
• Contour farming and grassed waterways help to control water erosion, although the slopes in most areas are too short or too irregular for contouring.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration in areas of the Raber soil.

Interpretive Groups

Land capability classification: Eakin—IIIe-3; Raber—IIe-2
Range site: Eakin—Silty; Raber—Clayey
Windbreak suitability group: Eakin—3; Raber—4
Pasture suitability group: Eakin—F; Raber—E

GfF—Gettys-Sansarc complex, 9 to 40 percent slopes

Composition

Gettys and similar soils: 45 to 55 percent
Sansarc and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Dissected plains
Landform position: Gettys—shoulder slopes; Sansarc—back slopes
Slope range: Gettys—15 to 40 percent; Sansarc—15 to 40 percent
Shape of areas: Irregular
Size of areas: 5 to 600 acres

Typical Profile

Gettys

Surface layer:
0 to 3 inches—dark grayish brown, calcareous clay loam

Subsoil:
3 to 10 inches—grayish brown, calcareous clay loam
10 to 24 inches—light brownish gray, calcareous clay loam

Underlying layer:
24 to 43 inches—light brownish gray, calcareous clay loam
43 to 60 inches—light brownish gray, calcareous clay that has accumulations of gypsum

Sansarc

Surface layer:
0 to 4 inches—dark grayish brown clay

Transitional layer:
4 to 10 inches—grayish brown, calcareous clay

Underlying layer:
10 to 18 inches—light brownish gray, calcareous clay
18 to 60 inches—light brownish gray, calcareous shale

Soil Properties and Qualities

Drainage class: Gettys—well drained; Sansarc—well drained
Depth to bedrock: Gettys—very deep; Sansarc—shallow
Depth to contrasting parent material: Gettys—more than 60 inches; Sansarc—10 to 20 inches over shale
Depth to a high water table: Gettys—more than 6 feet; Sansarc—more than 6 feet
Flooding: Gettys—none; Sansarc—none
Ponding: Gettys—none; Sansarc—none
Permeability: Gettys—slow; Sansarc—very slow
Available water capacity: Gettys—moderate; Sansarc—very low
Organic matter content: Gettys—moderately low; Sansarc—moderately low
Rate of surface runoff: Gettys—very high; Sansarc—very high
Other properties: Both soils have a high content of lime.

Inclusions

Contrasting inclusions:
• The moderately deep Opal soils on back slopes
Similar inclusions:
• Soils that are similar to the Sansarc soil but have a overburden of clay loam

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Water erosion
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Gettys—VIIe-3; Sansarc—VIIe-8
Range site: Gettys—Thin Upland; Sansarc—Shallow Clay
Windbreak suitability group: Gettys—10; Sansarc—10
Pasture suitability group: Gettys—NS; Sansarc—NS

GmB—Glenham-Java loams, 2 to 6 percent slopes

Composition

Glenham and similar soils: 55 to 65 percent
Java and similar soils: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Glenham—summits and back slopes; Java—shoulder slopes
Slope range: Glenham—2 to 6 percent; Java—2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 600 acres

Typical Profile

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Glenham—well drained; Java—well drained

Depth to bedrock: Glenham—very deep; Java—very deep
Depth to contrasting parent material: Glenham—more than 60 inches; Java—more than 60 inches
Depth to a high water table: Glenham—more than 6 feet; Java—more than 6 feet
Flooding: Glenham—none; Java—none
Ponding: Glenham—none; Java—none
Permeability: Glenham—moderately slow; Java—moderately slow
Available water capacity: Glenham—high; Java—high
Organic matter content: Glenham—moderate; Java—moderately low
Rate of surface runoff: Glenham—medium; Java—medium

Inclusions

Contrasting inclusions:
• The poorly drained Hoven and Plankinton soils in basins
• The moderately well drained Onita soils on foot slopes
• The moderately well drained Prosper soils, which have more sand than the Onita soils and are on foot slopes
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
Similar inclusions:
• Areas of Java soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.

Interpretive Groups

Land capability classification: Glenham—IIe-2; Java—IIIe-12
Range site: Glenham—Silty; Java—Silty
Windbreak suitability group: Glenham—3; Java—8
Pasture suitability group: Glenham—F; Java—G

GnA—Glenham-Java-Cavo loams, 0 to 4 percent slopes

Composition

Glenham and similar soils: 35 to 45 percent
Java and similar soils: 25 to 30 percent
Cavo and similar soils: 20 to 25 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Glenham—summits and back slopes; Java—shoulder slopes; Cavo—foot slopes
Slope range: Glenham—0 to 4 percent; Java—1 to 4 percent; Cavo—0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 300 acres

Typical Profile

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Cavo

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsurface layer:
5 to 7 inches—grayish brown loam

Subsoil:
7 to 18 inches—dark grayish brown clay loam
18 to 29 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts

Underlying layer:
29 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Glenham—well drained; Java—well drained; Cavo—moderately well drained
Depth to bedrock: Glenham—very deep; Java—very deep; Cavo—very deep

Depth to contrasting parent material: Glenham—more than 60 inches; Java—more than 60 inches; Cavo—more than 60 inches
Depth to a high water table: Glenham—more than 6 feet; Java—more than 6 feet; Cavo—3.5 to 5 feet
Flooding: Glenham—none; Java—none; Cavo—none
Ponding: Glenham—none; Java—none; Cavo—none
Permeability: Glenham—moderately slow; Java—moderately slow; Cavo—very slow
Available water capacity: Glenham—high; Java—high; Cavo—moderate
Organic matter content: Glenham—moderate; Java—moderately low; Cavo—moderately low
Rate of surface runoff: Glenham—low; Java—medium; Cavo—medium
Other properties: The Cavo soil has a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
- The poorly drained Hoven and Plankinton soils in basins
- Jerauld soils, which have salts within a depth of 16 inches and are on foot slopes
- The moderately well drained Prosper soils, which are dark to a depth of more than 20 inches and are on foot slopes
- The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Glenham and Java—water erosion; Cavo—the sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots, and the slow water intake rate
Management measures:
- Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
- Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Glenham—IIe-2; Java—IIIe-12; Cavo—IVs-2
Range site: Glenham—Silty; Java—Silty; Cavo—Claypan
Windbreak suitability group: Glenham—3; Java—8; Cavo—9
Pasture suitability group: Glenham—F; Java—G; Cavo—C

GrA—Glenham-Prosper loams, 0 to 2 percent slopes

Composition

Glenham and similar soils: 50 to 60 percent
Prosper and similar soils: 35 to 40 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Glenham—summits and back slopes; Prosper—foot slopes
Slope range: Glenham—0 to 2 percent; Prosper—0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 550 acres

Typical Profile

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Prosper

Surface soil:
0 to 13 inches—dark gray loam

Subsoil:
13 to 28 inches—dark grayish brown silty clay loam
28 to 36 inches—light brownish gray, calcareous clay loam

Underlying layer:
36 to 60 inches—pale yellow, calcareous loam

Soil Properties and Qualities

Drainage class: Glenham—well drained; Prosper—moderately well drained
Depth to bedrock: Glenham—very deep; Prosper—very deep
Depth to contrasting parent material: Glenham—more than 60 inches; Prosper—more than 60 inches
Depth to a high water table: Glenham—more than 6 feet; Prosper—3.5 to 5 feet
Flooding: Glenham—none; Prosper—none
Ponding: Glenham—none; Prosper—none
Permeability: Glenham—moderately slow; Prosper—moderately slow

Available water capacity: Glenham—high; Prosper—high
Organic matter content: Glenham—moderate; Prosper—high
Rate of surface runoff: Glenham—low; Prosper—low
Other properties: Runoff water flows over areas of the Prosper soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• The poorly drained Hoven and Plankinton soils in basins
• Java soils, which have lime within a depth of 10 inches and are on shoulder slopes
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
Similar inclusions:
• Soils that have more clay and less sand in the subsoil than the Prosper soil

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Conserving moisture
Management measures:
• Minimizing tillage and leaving crop residue on the surface help to conserve moisture.

Interpretive Groups

Land capability classification: Glenham—IIc-2; Prosper—IIc-3
Range site: Glenham—Silty; Prosper—Loamy Overflow
Windbreak suitability group: Glenham—3; Prosper—1
Pasture suitability group: Glenham—F; Prosper—K

GrB—Glenham-Prosper loams, 2 to 6 percent slopes

Composition

Glenham and similar soils: 55 to 65 percent
Prosper and similar soils: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Glenham—summits and back slopes; Prosper—foot slopes
Slope range: Glenham—2 to 6 percent; Prosper—2 to 4 percent
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Prosper

Surface soil:
0 to 13 inches—dark gray loam

Subsoil:
13 to 28 inches—dark grayish brown silty clay loam
28 to 36 inches—light brownish gray, calcareous clay loam

Underlying layer:
36 to 60 inches—pale yellow, calcareous loam

Soil Properties and Qualities

Drainage class: Glenham—well drained; Prosper—moderately well drained
Depth to bedrock: Glenham—very deep; Prosper—very deep
Depth to contrasting parent material: Glenham—more than 60 inches; Prosper—more than 60 inches
Depth to a high water table: Glenham—more than 6 feet; Prosper—3.5 to 5 feet
Flooding: Glenham—none; Prosper—none
Ponding: Glenham—none; Prosper—none
Permeability: Glenham—moderately slow; Prosper—moderately slow
Available water capacity: Glenham—high; Prosper—high
Organic matter content: Glenham—moderate; Prosper—high
Rate of surface runoff: Glenham—medium; Prosper—medium
Other properties: Runoff water flows over areas of the Prosper soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• The poorly drained Hoven and Plankinton soils in basins
• Java soils, which have lime within a depth of 10 inches and are on shoulder slopes
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes

Similar inclusions:
• Soils that have more clay and less sand in the subsoil than the Prosper soil

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.

Interpretive Groups

Land capability classification: Glenham—IIe-2; Prosper—IIe-3
Range site: Glenham—Silty; Prosper—Silty
Windbreak suitability group: Glenham—3; Prosper—1
Pasture suitability group: Glenham—F; Prosper—K

GsA—Glenham-Prosper-Hoven complex, 0 to 4 percent slopes

Composition

Glenham and similar soils: 35 to 45 percent
Prosper and similar soils: 25 to 30 percent
Hoven and similar soils: 20 to 25 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Glenham—summits and back slopes; Prosper—foot slopes; Hoven—basins
Slope range: Glenham—2 to 4 percent; Prosper—0 to 2 percent; Hoven—0 to 1 percent
Shape of areas: Irregular
Size of areas: 10 to 1,000 acres

Typical Profile

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Prosper

Surface soil:
0 to 13 inches—dark gray loam

Subsoil:
13 to 28 inches—dark grayish brown silty clay loam
28 to 36 inches—light brownish gray, calcareous clay loam

Underlying layer:
36 to 60 inches—pale yellow, calcareous loam

Hoven

Surface layer:
0 to 3 inches—gray silt loam

Subsoil:
3 to 25 inches—dark gray silty clay
25 to 42 inches—dark gray, calcareous silty clay
42 to 55 inches—gray, calcareous silty clay

Underlying layer:
55 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Glenham—well drained; Prosper—moderately well drained; Hoven—poorly drained
Depth to bedrock: Glenham—very deep; Prosper—very deep; Hoven—very deep
Depth to contrasting parent material: Glenham—more than 60 inches; Prosper—more than 60 inches; Hoven—more than 60 inches
Depth to a high water table: Glenham—more than 6 feet; Prosper—3.5 to 5 feet; Hoven—1.0 above to 1.5 feet below the surface
Flooding: Glenham—none; Prosper—none; Hoven—none
Ponding: Glenham—none; Prosper—none; Hoven—occasional for long periods
Permeability: Glenham—moderately slow; Prosper—moderately slow; Hoven—very slow
Available water capacity: Glenham—high; Prosper—high; Hoven—moderate
Organic matter content: Glenham—moderate; Prosper—high; Hoven—moderate
Rate of surface runoff: Glenham—low; Prosper—low; Hoven—negligible
Other properties: Runoff water flows over areas of the Prosper soil during periods of rainfall or snowmelt; the Hoven soil has a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• Java soils, which have lime within a depth of 10 inches and are on shoulder slopes

• The poorly drained Plankinton and Tetonka soils, which do not have a sodium-affected subsoil and are in basins
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes

Similar inclusions:
• Soils that are similar to the Prosper soil but have more clay and less sand in the subsoil

Use and Management

Cropland

Main crops: Glenham—wheat, barley, and alfalfa; Hoven—wheat and barley
Suitability for cropland: Glenham—well suited; Hoven—generally unsuited
Management concerns: Glenham—water erosion; Prosper—conserving moisture; Hoven—wetness and the sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.
• Delaying tillage in areas of the Hoven soil during wet periods helps to minimize soil compaction.

Interpretive Groups

Land capability classification: Glenham—IIe-2; Prosper—IIc-3; Hoven—VIs-1
Range site: Glenham—Silty; Prosper—Loamy Overflow; Hoven—Closed Depression
Windbreak suitability group: Glenham—3; Prosper—1; Hoven—10
Pasture suitability group: Glenham—F; Prosper—K; Hoven—B2

GtB—Glenham-Prosper-Java loams, 1 to 6 percent slopes

Composition

Glenham and similar soils: 40 to 45 percent
Prosper and similar soils: 25 to 30 percent
Java and similar soils: 20 to 25 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position (fig. 9): Glenham—summits and back slopes; Prosper—foot slopes; Java—shoulder slopes
Slope range: Glenham—1 to 6 percent; Prosper—1 to 4 percent; Java—2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 600 acres

Typical Profile

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Prosper

Surface soil:
0 to 13 inches—dark gray loam

Subsoil:
13 to 28 inches—dark grayish brown silty clay loam
28 to 36 inches—light brownish gray, calcareous clay loam

Underlying layer:
36 to 60 inches—pale yellow, calcareous loam

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Glenham—well drained; Prosper—moderately well drained; Java—well drained
Depth to bedrock: Glenham—very deep; Prosper—very deep; Java—very deep
Depth to contrasting parent material: Glenham—more than 60 inches; Prosper—more than 60 inches; Java—more than 60 inches
Depth to a high water table: Glenham—more than 6 feet; Prosper—3.5 to 5 feet; Java—more than 6 feet
Flooding: Glenham—none; Prosper—none; Java—none
Ponding: Glenham—none; Prosper—none; Java—none
Permeability: Glenham—moderately slow; Prosper—moderately slow; Java—moderately slow
Available water capacity: Glenham—high; Prosper—high; Java—high

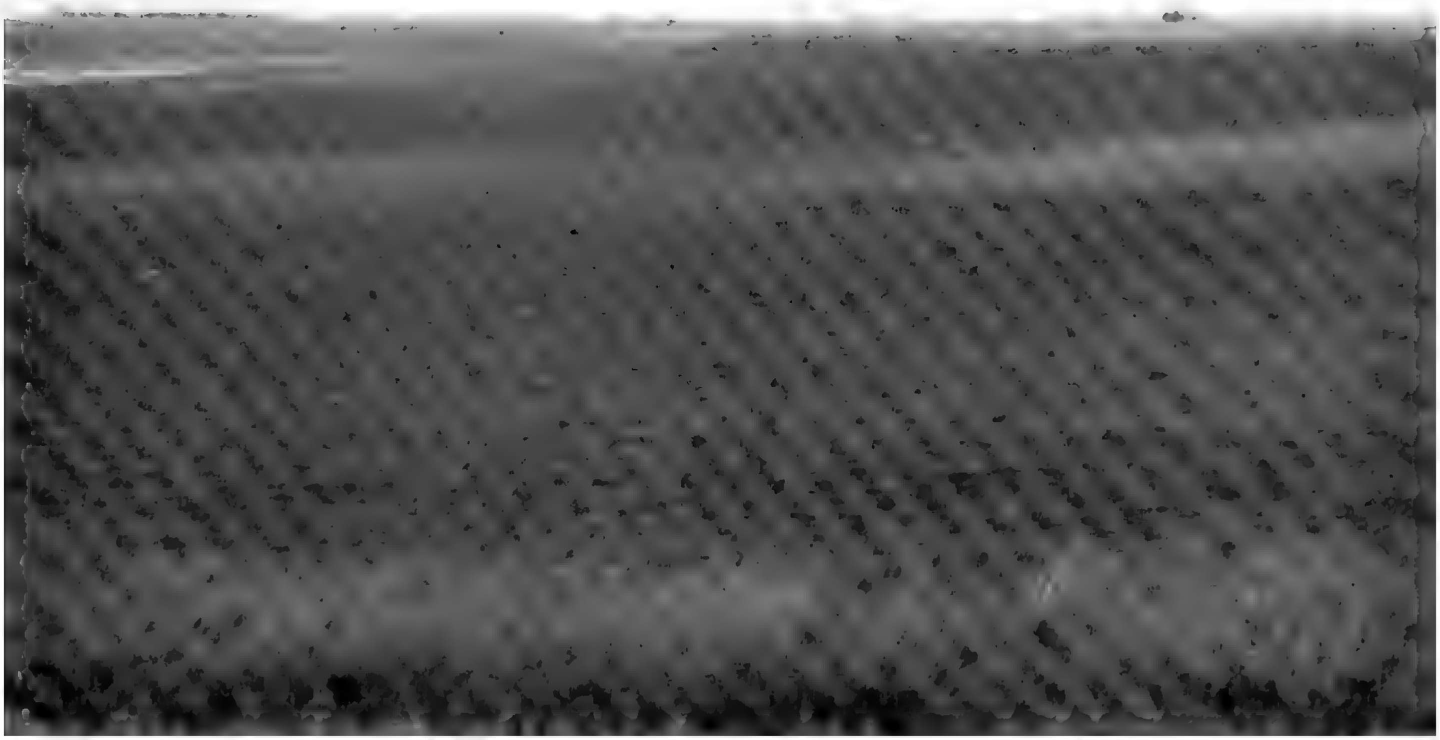

Figure 9.—An area of Glenham-Prosper-Java loams, 1 to 6 percent slopes. The light colored Java soils are on shoulder slopes, the dark colored Prosper soils are on foot slopes, and the Glenham soils are on back slopes.

Organic matter content: Glenham—moderate; Prosper—high; Java—moderately low
Rate of surface runoff: Glenham—medium; Prosper—low; Java—medium
Other properties: Runoff water flows over areas of the Prosper soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• The poorly drained Hoven and Plankinton soils in basins
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
Similar inclusions:
• Soils that are similar to the Prosper soil but have more clay and less sand in the subsoil
• Areas of Java soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.

Interpretive Groups

Land capability classification: Glenham—IIe-2; Prosper—IIe-3; Java—IIIe-12
Range site: Glenham—Silty; Prosper—Silty; Java—Silty
Windbreak suitability group: Glenham—3; Prosper—1; Java—8
Pasture suitability group: Glenham—F; Prosper—K; Java—G

GuA—Glenham-Stickney-Hoven complex, 0 to 4 percent slopes

Composition

Glenham and similar soils: 35 to 40 percent
Stickney and similar soils: 25 to 35 percent
Hoven and similar soils: 20 to 25 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Glenham—summits and back slopes; Stickney—foot slopes; Hoven—basins
Slope range: Glenham—0 to 4 percent; Stickney—0 to 2 percent; Hoven—0 to 1 percent
Shape of areas: Irregular
Size of areas: 10 to 600 acres

Typical Profile

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Stickney

Surface layer:
0 to 6 inches—dark gray loam

Subsurface layer:
6 to 11 inches—gray silty clay loam

Transitional layer:
11 to 14 inches—gray and light brownish gray silty clay loam

Subsoil:
14 to 28 inches—gray silty clay
28 to 32 inches—grayish brown, calcareous silty clay
32 to 45 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of salts

Underlying layer:
45 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of salts

Hoven

Surface layer:
0 to 3 inches—gray silt loam

Subsoil:
3 to 25 inches—dark gray silty clay
25 to 42 inches—dark gray, calcareous silty clay
42 to 55 inches—gray, calcareous silty clay

Underlying layer:
55 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Glenham—well drained; Stickney—moderately well drained; Hoven—poorly drained
Depth to bedrock: Glenham—very deep; Stickney—very deep; Hoven—very deep
Depth to contrasting parent material: Glenham—more than 60 inches; Stickney—more than 60 inches; Hoven—more than 60 inches
Depth to a high water table: Glenham—more than 6 feet; Stickney—3.5 to 5 feet; Hoven—1.0 foot above to 1.5 feet below the surface
Flooding: Glenham—none; Stickney—none; Hoven—none
Ponding: Glenham—none; Stickney—none; Hoven—occasional for long periods
Permeability: Glenham—moderately slow; Stickney—slow; Hoven—very slow
Available water capacity: Glenham—high; Stickney—high; Hoven—moderate
Organic matter content: Glenham—moderate; Stickney—moderate; Hoven—moderate
Rate of surface runoff: Glenham—low; Stickney—medium; Hoven—negligible
Other properties: The Stickney and Hoven soils have a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• The moderately well drained Cavo and Jerauld soils, which have salts that are less deep than in the Stickney soil; on lower foot slopes
• The well drained Java soils, which have lime within a depth of 10 inches and are on shoulder slopes
• The moderately well drained Onita and Prosper soils, which do not have a sodium-affected subsoil and are on foot slopes
• The poorly drained Plankinton soils, which do not have a sodium-affected subsoil and are in basins

Use and Management

Cropland

Main crops: Glenham and Stickney—wheat, barley, and alfalfa; Hoven—wheat and barley
Suitability for cropland: Glenham—well suited; Stickney—fairly well suited; Hoven—generally unsuited
Management concerns: Glenham—water erosion;

Stickney—the sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots, and the slow water intake rate; Hoven—wetness, the sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), and the slow water intake rate

Management measures:

• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help conserve moisture, control erosion, and maintain tilth.

• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

• Delaying tillage in areas of the Hoven soil during wet periods helps to minimize soil compaction.

Interpretive Groups

Land capability classification: Glenham—IIe-2; Stickney—IIIs-1; Hoven—VIs-1

Range site: Glenham—Silty; Stickney—Clayey; Hoven—Closed Depression

Windbreak suitability group: Glenham—3; Stickney—4; Hoven—10

Pasture suitability group: Glenham—F; Stickney—E; Hoven—B2

HaA—Henkin-Blendon fine sandy loams, 0 to 4 percent slopes

Composition

Henkin and similar soils: 50 to 60 percent
Blendon and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Terraces

Landform position: Henkin—summits and back slopes; Blendon—foot slopes

Slope range: Henkin—0 to 4 percent; Blendon—0 to 2 percent

Shape of areas: Irregular

Size of areas: 10 to 100 acres

Typical Profile

Henkin

Surface layer:
0 to 6 inches—dark gray fine sandy loam

Subsoil:
6 to 11 inches—dark grayish brown fine sandy loam
11 to 18 inches—grayish brown fine sandy loam
18 to 27 inches—light brownish gray, calcareous fine sandy loam

Underlying layer:
27 to 39 inches—light brownish gray, calcareous, stratified loamy fine sand and fine sandy loam
39 to 60 inches—light gray, calcareous, stratified loamy fine sand and fine sandy loam

Blendon

Surface soil:
0 to 16 inches—dark gray fine sandy loam

Subsoil:
16 to 23 inches—dark grayish brown sandy loam
23 to 40 inches—grayish brown sandy loam
40 to 48 inches—light brownish gray, calcareous loamy sand

Underlying layer:
48 to 60 inches—light yellowish brown, calcareous loamy sand

Soil Properties and Qualities

Drainage class: Henkin—well drained; Blendon—well drained

Depth to bedrock: Henkin—very deep; Blendon—very deep

Depth to contrasting parent material: Henkin—more than 60 inches; Blendon—more than 60 inches

Depth to a high water table: Henkin—more than 6 feet; Blendon—more than 6 feet

Flooding: Henkin—none; Blendon—none

Ponding: Henkin—none; Blendon—none

Permeability: Henkin—moderately rapid; Blendon—moderately rapid

Available water capacity: Henkin—moderate; Blendon—moderate

Organic matter content: Henkin—moderately low; Blendon—moderate

Rate of surface runoff: Henkin—low; Blendon—low

Other properties: Runoff water flows over areas of the Blendon soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:

• Edwin soils, which have less sand throughout the profile than the Henkin and Blendon soils and are on shoulder slopes along adjacent lake plains

• Java soils, which have less sand throughout the profile than the Henkin and Blendon soils and are on shoulder slopes along adjacent till plains

• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:

• Soils that have lime and sand closer to the surface than the major soils

• Soils that are similar to the Blendon soil but that have a water table between a depth of 4 and 6 feet for part of the year

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: Henkin—wind and water erosion; Blendon—wind erosion
Management measures:
• These soils are better suited to early-maturing crops, such as small grains.
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion and conserve moisture.
• Stripcropping and field windbreaks help to control wind erosion.

Interpretive Groups

Land capability classification: Henkin—IIIe-8; Blendon—IIIe-8
Range site: Henkin—Sandy; Blendon—Sandy
Windbreak suitability group: Henkin—5; Blendon—5
Pasture suitability group: Henkin—H; Blendon—H

HdA—Highmore-DeGrey silt loams, 0 to 2 percent slopes

Composition

Highmore and similar soils: 45 to 55 percent
DeGrey and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Highmore—summits and back slopes; DeGrey—foot slopes
Slope range: Highmore—0 to 2 percent; DeGrey—0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 2,500 acres

Typical Profile

Highmore

Surface layer:
0 to 7 inches—very dark grayish brown silt loam

Subsoil:
7 to 13 inches—dark grayish brown silty clay loam
13 to 24 inches—brown silty clay loam
24 to 31 inches—pale brown, calcareous silty clay loam
31 to 39 inches—light yellowish brown, calcareous silty clay loam

Underlying layer:
39 to 60 inches—light brownish gray, calcareous silt loam

DeGrey

Surface layer:
0 to 5 inches—dark gray silt loam

Subsurface layer:
5 to 8 inches—gray silt loam

Subsoil:
8 to 13 inches—dark grayish brown silty clay
13 to 18 inches—grayish brown silty clay
18 to 29 inches—grayish brown, calcareous silty clay that has accumulations of gypsum and other salts
29 to 39 inches—light brownish gray, calcareous silty clay loam that has accumulations of gypsum and other salts

Underlying layer:
39 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Highmore—well drained; DeGrey—moderately well drained
Depth to bedrock: Highmore—very deep; DeGrey—very deep
Depth to contrasting parent material: Highmore—40 to more than 60 inches over loamy glacial till; DeGrey—20 to 40 inches over glacial till
Depth to a high water table: Highmore—more than 6 feet; DeGrey—3.5 to 5 feet
Flooding: Highmore—none; DeGrey—none
Ponding: Highmore—none; DeGrey—none
Permeability: Highmore—moderate; DeGrey—very slow
Available water capacity: Highmore—high; DeGrey—high
Organic matter content: Highmore—moderate; DeGrey—moderate
Rate of surface runoff: Highmore—low; DeGrey—medium
Other properties: The DeGrey soil has a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• The poorly drained Hoven and Plankinton soils in basins
• The moderately well drained Onita soils, which do not have a sodium-affected subsoil and are on foot slopes
Similar inclusions:
• Soils that are similar to the Highmore soil but have glacial till between a depth of 20 and 40 inches

• Soils that are similar to the DeGrey soil but have glacial till within a depth of 20 inches

Use and Management

Cropland

Main crops: Wheat, corn, oats, sunflowers, and alfalfa
Suitability for cropland: Well suited
Management concerns: Highmore—conserving moisture; DeGrey—the sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots, and the slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Highmore—IIc-2; DeGrey—IVs-2
Range site: Highmore—Silty; DeGrey—Claypan
Windbreak suitability group: Highmore—3; DeGrey—9
Pasture suitability group: Highmore—F; DeGrey—C

HdB—Highmore-DeGrey silt loams, 2 to 6 percent slopes

Composition

Highmore and similar soils: 50 to 60 percent
DeGrey and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Highmore—summits and back slopes; DeGrey—foot slopes
Slope range: Highmore—2 to 6 percent; DeGrey—2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Highmore

Surface layer:
0 to 7 inches—very dark grayish brown silt loam

Subsoil:
7 to 13 inches—dark grayish brown silty clay loam
13 to 24 inches—brown silty clay loam
24 to 31 inches—pale brown, calcareous silty clay loam
31 to 39 inches—light yellowish brown, calcareous silty clay loam

Underlying layer:
39 to 60 inches—light brownish gray, calcareous silt loam

DeGrey

Surface layer:
0 to 5 inches—dark gray silt loam

Subsurface layer:
5 to 8 inches—gray silt loam

Subsoil:
8 to 13 inches—dark grayish brown silty clay
13 to 18 inches—grayish brown silty clay
18 to 29 inches—grayish brown, calcareous silty clay that has accumulations of gypsum and other salts
29 to 39 inches—light brownish gray, calcareous silty clay loam that has accumulations of gypsum and other salts

Underlying layer:
39 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Highmore—well drained; DeGrey—moderately well drained
Depth to bedrock: Highmore—very deep; DeGrey—very deep
Depth to contrasting parent material: Highmore—40 to more than 60 inches over loamy glacial till; DeGrey—20 to 40 inches over glacial till
Depth to a high water table: Highmore—more than 6 feet; DeGrey—3.5 to 5 feet
Flooding: Highmore—none; DeGrey—none
Ponding: Highmore—none; DeGrey—none
Permeability: Highmore—moderate; DeGrey—very slow
Available water capacity: Highmore—high; DeGrey—high
Organic matter content: Highmore—moderate; DeGrey—moderate
Rate of surface runoff: Highmore—medium; DeGrey—high
Other properties: The DeGrey soil has a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• The poorly drained Hoven and Plankinton soils in basins
• The moderately well drained Onita soils, which do not have a sodium-affected subsoil and are on foot slopes
• The well drained Raber soils, which have more clay in the subsoil than the Highmore soil and are on shoulder slopes

Similar inclusions:
• Soils that are similar to the Highmore soil but have glacial till between a depth of 20 and 40 inches
• Soils that are similar to the DeGrey soil but have glacial till within a depth of 20 inches

Use and Management

Cropland

Main crops: Wheat, corn, oats, sunflowers, and alfalfa
Suitability for cropland: Well suited
Management concerns: Highmore—water erosion; DeGrey—the sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), the slow water intake rate, and water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Highmore—IIe-2; DeGrey—IVs-3
Range site: Highmore—Silty; DeGrey—Claypan
Windbreak suitability group: Highmore—3; DeGrey—9
Pasture suitability group: Highmore—F; DeGrey—C

HeA—Highmore-Eakin silt loams, 0 to 2 percent slopes

Composition

Highmore and similar soils: 60 to 70 percent
Eakin and similar soils: 25 to 30 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Highmore—summits and back slopes; Eakin—shoulder slopes
Slope range: Highmore—0 to 2 percent; Eakin—0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 300 acres

Typical Profile

Highmore

Surface layer:
0 to 7 inches—very dark grayish brown silt loam

Subsoil:
7 to 13 inches—dark grayish brown silty clay loam
13 to 24 inches—brown silty clay loam
24 to 31 inches—pale brown, calcareous silty clay loam
31 to 39 inches—light yellowish brown, calcareous silty clay loam

Underlying layer:
39 to 60 inches—light brownish gray, calcareous silt loam

Eakin

Surface layer:
0 to 7 inches—dark grayish brown silt loam

Subsoil:
7 to 14 inches—dark grayish brown silty clay loam
14 to 29 inches—light olive brown, calcareous silty clay loam
29 to 45 inches—light brownish gray, calcareous clay loam

Underlying layer:
45 to 53 inches—light brownish gray, calcareous clay loam
53 to 60 inches—olive gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Highmore—well drained; Eakin—well drained
Depth to bedrock: Highmore—very deep; Eakin—very deep
Depth to contrasting parent material: Highmore—40 to more than 60 inches over loamy glacial till; Eakin—20 to 40 inches over loamy glacial till
Depth to a high water table: Highmore—more than 6 feet; Eakin—more than 6 feet
Flooding: Highmore—none; Eakin—none
Ponding: Highmore—none; Eakin—none
Permeability: Highmore—moderate; Eakin—moderately slow
Available water capacity: Highmore—high; Eakin—high
Organic matter content: Highmore—moderate; Eakin—moderate
Rate of surface runoff: Highmore—low; Eakin—low

Inclusions

Contrasting inclusions:
• The moderately well drained DeGrey soils, which have a sodium-affected subsoil and are on lower foot slopes
• The moderately well drained Walke soils, which have a sodium-affected subsoil and are on foot slopes
• The moderately well drained Onita soils, which are dark to a depth of more than 20 inches and are on foot slopes
• The poorly drained Hoven and Plankinton soils in basins

Use and Management

Cropland

Main crops: Wheat, corn, oats, sunflowers, and alfalfa
Suitability for cropland: Well suited
Management concerns: Conserving moisture
Management measures:
• Minimizing tillage and leaving crop residue on the surface help to conserve moisture.

Interpretive Groups

Land capability classification: Highmore—IIc-2; Eakin—IIc-2
Range site: Highmore—Silty; Eakin—Silty
Windbreak suitability group: Highmore—3; Eakin—3
Pasture suitability group: Highmore—F; Eakin—F

HeB—Highmore-Eakin silt loams, 2 to 6 percent slopes

Composition

Highmore and similar soils: 50 to 60 percent
Eakin and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Highmore—summits and back slopes; Eakin—shoulder slopes
Slope range: Highmore—2 to 6 percent; Eakin—2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Highmore

Surface layer:
0 to 7 inches—very dark grayish brown silt loam

Subsoil:
7 to 13 inches—dark grayish brown silty clay loam
13 to 24 inches—brown silty clay loam
24 to 31 inches—pale brown, calcareous silty clay loam
31 to 39 inches—light yellowish brown, calcareous silty clay loam

Underlying layer:
39 to 60 inches—light brownish gray, calcareous silt loam

Eakin

Surface layer:
0 to 7 inches—dark grayish brown silt loam

Subsoil:
7 to 14 inches—dark grayish brown silty clay loam
14 to 29 inches—light olive brown, calcareous silty clay loam
29 to 45 inches—light brownish gray, calcareous clay loam

Underlying layer:
45 to 53 inches—light brownish gray, calcareous clay loam
53 to 60 inches—olive gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Highmore—well drained; Eakin—well drained
Depth to bedrock: Highmore—very deep; Eakin—very deep
Depth to contrasting parent material: Highmore—40 to more than 60 inches over loamy glacial till; Eakin—20 to 40 inches over loamy glacial till
Depth to a high water table: Highmore—more than 6 feet; Eakin—more than 6 feet
Flooding: Highmore—none; Eakin—none
Ponding: Highmore—none; Eakin—none
Permeability: Highmore—moderate; Eakin—moderately slow
Available water capacity: Highmore—high; Eakin—high
Organic matter content: Highmore—moderate; Eakin—moderate
Rate of surface runoff: Highmore—medium; Eakin—medium

Inclusions

Contrasting inclusions:
• The moderately well drained DeGrey soils, which have a sodium-affected subsoil and are on lower foot slopes
• The moderately well drained Onita soils, which are dark to a depth of more than 20 inches and are on foot slopes
• The poorly drained Hoven and Plankinton soils in basins
• Raber soils, which have more clay in the subsoil and are on shoulder slopes

Use and Management

Cropland

Main crops: Wheat, corn, oats, sunflowers, and alfalfa
Suitability for cropland: Well suited
Management concerns: Water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.
• Contour farming and grassed waterways help to control erosion, but the slopes in some areas are too short or too irregular for contouring.

Interpretive Groups

Land capability classification: Highmore—IIe-2; Eakin—IIe-2
Range site: Highmore—Silty; Eakin—Silty
Windbreak suitability group: Highmore—3; Eakin—3
Pasture suitability group: Highmore—F; Eakin—F

Ho—Hoven silt loam

Composition

Hoven and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Till plains
Landform position: Basins
Slope range: 0 to 1 percent
Shape of areas: Elliptical or oblong
Size of areas: 5 to 150 acres

Typical Profile

Surface layer:
0 to 3 inches—gray silt loam

Subsoil:
3 to 25 inches—dark gray silty clay
25 to 42 inches—dark gray, calcareous silty clay
42 to 55 inches—gray, calcareous silty clay

Underlying layer:
55 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: 1.0 foot above to 1.5 feet below the surface
Flooding: None
Ponding: Occasional for long periods
Permeability: Very slow
Available water capacity: Moderate
Organic matter content: Moderate
Rate of surface runoff: Negligible
Other properties: The soil has a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• The moderately well drained Prosper soils, which contain less clay, do not have a sodium-affected subsoil, and are on adjacent foot slopes
• The moderately well drained Stickney soils on adjacent foot slopes
• The moderately well drained Onita soils, which do not have a sodium-affected subsoil and are on foot slopes
• Plankinton soils, which do not have a sodium-affected subsoil and are in the center of mapped areas

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: The sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), the slow water intake rate, and wetness
Management measures:
• Proper grazing management helps to maintain plant vigor and minimize compaction when the soil is wet.
• Maintaining the existing drainage system helps remove excess water.

Interpretive Groups

Land capability classification: VIs-1
Range site: Closed Depression
Windbreak suitability group: 10
Pasture suitability group: B2

HuB—Hurley silt loam, 0 to 6 percent slopes

Composition

Hurley and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Plains
Landform position: Foot slopes
Slope range: 0 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 30 acres

Typical Profile

Surface layer:
0 to 2 inches—light brownish gray silt loam

Subsoil:
2 to 4 inches—dark grayish brown clay
4 to 8 inches—dark grayish brown clay
8 to 14 inches—dark grayish brown, calcareous clay that has accumulations of salts
14 to 21 inches—grayish brown and light brownish gray, calcareous clay that has accumulations of gypsum and other salts

Underlying layer:
21 to 30 inches—light brownish gray and grayish brown,

calcareous clay that has accumulations of gypsum and other salts
30 to 60 inches—light gray and olive yellow, calcareous shale that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Moderately deep
Depth to contrasting parent material: 20 to 40 inches over shale
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Very slow
Available water capacity: Low
Organic matter content: Moderately low
Rate of surface runoff: High
Other properties: The soil has a sodium-affected subsoil and a high content of salts.

Inclusions

Contrasting inclusions:
• The very deep Bullcreek soils on foot slopes
• Opal soils, which do not have a sodium-affected subsoil and are on adjacent back slopes
Similar inclusions:
• Soils that are more than 40 inches deep over shale

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: The sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), the slow water intake rate, and water erosion
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, control erosion, and maintain tilth.

Interpretive Groups

Land capability classification: VIs-1
Range site: Thin Claypan
Windbreak suitability group: 10
Pasture suitability group: NS

JaC—Java, stony-Glenham-Prosper loams, 1 to 9 percent slopes

Composition

Java and similar soils: 35 to 45 percent
Glenham and similar soils: 25 to 30 percent
Prosper and similar soils: 20 to 25 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Java—shoulder slopes; Glenham—back slopes; Prosper—foot slopes
Slope range: Java—3 to 9 percent; Glenham—3 to 9 percent; Prosper—1 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Prosper

Surface soil:
0 to 13 inches—dark gray loam

Subsoil:
13 to 28 inches—dark grayish brown silty clay loam
28 to 36 inches—light brownish gray, calcareous clay loam

Underlying layer:
36 to 60 inches—pale yellow, calcareous loam

Soil Properties and Qualities

Drainage class: Java—well drained; Glenham—well drained; Prosper—moderately well drained
Depth to bedrock: Java—very deep; Glenham—very deep; Prosper—very deep
Depth to contrasting parent material: Java—more than 60

inches; Glenham—more than 60 inches; Prosper—more than 60 inches
Depth to a high water table: Java—more than 6 feet; Glenham—more than 6 feet; Prosper—3.5 to 5 feet
Flooding: Java—none; Glenham—none; Prosper—none
Ponding: Java—none; Glenham—none; Prosper—none
Permeability: Java—moderately slow; Glenham—moderately slow; Prosper—moderately slow
Available water capacity: Java—high; Glenham—high; Prosper—high
Organic matter content: Java—moderately low; Glenham—moderate; Prosper—high
Rate of surface runoff: Java—medium; Glenham—medium; Prosper—medium
Other properties: Scattered stones and boulders cover the surface in areas of the Java soil; runoff water flows over areas of the Prosper soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• Cavo soils, which have a sodium-affected subsoil and are on lower foot slopes
• Stickney soils, which have a sodium-affected subsoil and are on foot slopes
• The poorly drained Hoven and Plankinton soils in basins
• The excessively drained Talmo soils on shoulder slopes
Similar inclusions:
• Soils that are similar to the Prosper soil but have more clay and less sand in the subsoil
• Areas where stones have been removed from the surface of the Java soil

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Java—excessive stones on surface and water erosion; Glenham and Prosper—water erosion
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Java—VIIs-6; Glenham—IIIe-2; Prosper—IIe-3
Range site: Java—Silty; Glenham—Silty; Prosper—Silty
Windbreak suitability group: Java—10; Glenham—3; Prosper—1
Pasture suitability group: Java—NS; Glenham—F; Prosper—K

JbD—Java-Betts loams, 6 to 15 percent slopes

Composition

Java and similar soils: 55 to 65 percent
Betts and similar soils: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Java—back slopes; Betts—shoulder slopes
Slope range: Java—6 to 15 percent; Betts—6 to 15 percent
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Betts

Surface layer:
0 to 2 inches—dark gray, calcareous loam

Subsoil:
2 to 10 inches—light brownish gray, calcareous clay loam
10 to 18 inches—light yellowish brown, calcareous clay loam
18 to 50 inches—light brownish gray, calcareous clay loam

Underlying layer:
50 to 60 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Java—well drained; Betts—well drained
Depth to bedrock: Java—very deep; Betts—very deep
Depth to contrasting parent material: Java—more than 60 inches; Betts—more than 60 inches
Depth to a high water table: Java—more than 6 feet; Betts—more than 6 feet
Flooding: Java—none; Betts—none
Ponding: Java—none; Betts—none

Permeability: Java—moderately slow; Betts—moderately slow
Available water capacity: Java—high; Betts—high
Organic matter content: Java—moderately low; Betts—moderately low
Rate of surface runoff: Java—high; Betts—high
Other properties: The Betts soil has a high content of lime.

Inclusions

Contrasting inclusions:
- Glenham soils, which do not have lime within a depth of 10 inches and are on back slopes
- The poorly drained Hoven and Plankinton soils in basins
- The moderately well drained Prosper soils on foot slopes

Similar inclusions:
- Areas of Betts soils that have scattered stones on the surface

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Java—water erosion; Betts—water erosion and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
- Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Java—VIe-3; Betts—VIe-3
Range site: Java—Silty; Betts—Thin Upland
Windbreak suitability group: Java—8; Betts—8
Pasture suitability group: Java—G; Betts—G

JcD—Java-Betts, stony, loams, 6 to 25 percent slopes

Composition

Java and similar soils: 55 to 65 percent
Betts and similar soils: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Java—back slopes; Betts—shoulder slopes
Slope range: Java—6 to 25 percent; Betts—6 to 25 percent
Shape of areas: Elongated or irregular
Size of areas: 5 to 150 acres

Typical Profile

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Betts

Surface layer:
0 to 2 inches—dark gray, calcareous loam

Subsoil:
2 to 10 inches—light brownish gray, calcareous clay loam
10 to 18 inches—light yellowish brown, calcareous clay loam
18 to 50 inches—light brownish gray, calcareous clay loam

Underlying layer:
50 to 60 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Java—well drained; Betts—well drained
Depth to bedrock: Java—very deep; Betts—very deep
Depth to contrasting parent material: Java—more than 60 inches; Betts—more than 60 inches
Depth to a high water table: Java—more than 6 feet; Betts—more than 6 feet
Flooding: Java—none; Betts—none
Ponding: Java—none; Betts—none
Permeability: Java—moderately slow; Betts—moderately slow
Available water capacity: Java—high; Betts—high
Organic matter content: Java—moderately low; Betts—moderately low
Rate of surface runoff: Java—high; Betts—high
Other properties: The Betts soil has a high content of lime; scattered stones are on the surface.

Inclusions

Contrasting inclusions:
- The moderately well drained Prosper soils on foot slopes
- The excessively drained Talmo soils on shoulder slopes

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Java—water erosion; Betts—excessive stones on the surface, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Java—VIe-3; Betts—VIIs-6
Range site: Java—Silty; Betts—Thin Upland
Windbreak suitability group: Java—10; Betts—10
Pasture suitability group: Java—NS; Betts—NS

JgB—Java-Glenham loams, 2 to 6 percent slopes

Composition

Java and similar soils: 45 to 55 percent
Glenham and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Java—shoulder slopes; Glenham—back slopes
Slope range: Java—2 to 6 percent; Glenham—2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 650 acres

Typical Profile

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Java—well drained; Glenham—well drained
Depth to bedrock: Java—very deep; Glenham—very deep
Depth to contrasting parent material: Java—more than 60 inches; Glenham—more than 60 inches
Depth to a high water table: Java—more than 6 feet; Glenham—more than 6 feet
Flooding: Java—none; Glenham—none
Ponding: Java—none; Glenham—none
Permeability: Java—moderately slow; Glenham—moderately slow
Available water capacity: Java—high; Glenham—high
Organic matter content: Java—moderately low; Glenham—moderate
Rate of surface runoff: Java—medium; Glenham—medium

Inclusions

Contrasting inclusions:
• The somewhat excessively drained Delmont soils on shoulder slopes
• The poorly drained Hoven and Plankinton soils in basins
• The moderately well drained Onita and Prosper soils on foot slopes
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
Similar inclusions:
• Soils that are similar to the Java soil but have lime at or near the surface
• Areas of Java soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: Water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.

Interpretive Groups

Land capability classification: Java—IIIe-12; Glenham—IIe-2

Range site: Java—Silty; Glenham—Silty
Windbreak suitability group: Java—8; Glenham—3
Pasture suitability group: Java—G; Glenham—F

JgC—Java-Glenham loams, 6 to 9 percent slopes

Composition

Java and similar soils: 50 to 60 percent
Glenham and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Java—shoulder slopes; Glenham—back slopes
Slope range: Java—6 to 9 percent; Glenham—6 to 9 percent
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Java—well drained; Glenham—well drained
Depth to bedrock: Java—very deep; Glenham—very deep
Depth to contrasting parent material: Java—more than 60 inches; Glenham—more than 60 inches
Depth to a high water table: Java—more than 6 feet; Glenham—more than 6 feet
Flooding: Java—none; Glenham—none
Ponding: Java—none; Glenham—none
Permeability: Java—moderately slow; Glenham—moderately slow
Available water capacity: Java—high; Glenham—high
Organic matter content: Java—moderately low; Glenham—moderate
Rate of surface runoff: Java—medium; Glenham—medium

Inclusions

Contrasting inclusions:
• The somewhat excessively drained Delmont soils on shoulder slopes
• The poorly drained Hoven and Plankinton soils in basins
• The moderately well drained Onita and Prosper soils on foot slopes
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
Similar inclusions:
• Soils that are similar to the Java soil but have lime at or near the surface
• Areas of Java soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Poorly suited
Management concerns: Water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, including grasses and legumes in the cropping system, and using grassed waterways help to conserve moisture and control erosion.

Interpretive Groups

Land capability classification: Java—IVe-3; Glenham—IIIe-2
Range site: Java—Silty; Glenham—Silty
Windbreak suitability group: Java—8; Glenham—3
Pasture suitability group: Java—G; Glenham—F

JhC—Java-Glenham-Prosper loams, 1 to 9 percent slopes

Composition

Java and similar soils: 35 to 45 percent
Glenham and similar soils: 25 to 30 percent

Prosper and similar soils: 20 to 25 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Java—shoulder slopes; Glenham—back slopes; Prosper—foot slopes
Slope range: Java—6 to 9 percent; Glenham—3 to 9 percent; Prosper—1 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 400 acres

Typical Profile

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Glenham

Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 13 inches—dark grayish brown clay loam
13 to 18 inches—grayish brown, calcareous clay loam
18 to 32 inches—light brownish gray, calcareous clay loam

Underlying layer:
32 to 60 inches—light brownish gray, calcareous clay loam

Prosper

Surface layer:
0 to 13 inches—dark gray loam

Subsoil:
13 to 28 inches—dark grayish brown silty clay loam
28 to 36 inches—light brownish gray, calcareous clay loam

Underlying layer:
36 to 60 inches—pale yellow, calcareous loam

Soil Properties and Qualities

Drainage class: Java—well drained; Glenham—well drained; Prosper—moderately well drained
Depth to bedrock: Java—very deep; Glenham—very deep; Prosper—very deep
Depth to contrasting parent material: Java—more than 60 inches; Glenham—more than 60 inches; Prosper—more than 60 inches
Depth to a high water table: Java—more than 6 feet; Glenham—more than 6 feet; Prosper—3.5 to 5 feet
Flooding: Java—none; Glenham—none; Prosper—none
Ponding: Java—none; Glenham—none; Prosper—none
Permeability: Java—moderately slow; Glenham—moderately slow; Prosper—moderately slow
Available water capacity: Java—high; Glenham—high; Prosper—high
Organic matter content: Java—moderately low; Glenham—moderate; Prosper—high
Rate of surface runoff: Java—medium; Glenham—medium; Prosper—medium
Other properties: Runoff water flows over areas of the Prosper soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• Stickney soils, which have a sodium-affected subsoil and are on foot slopes
• Cavo soils, which have a sodium-affected subsoil, have salts at a shallower depth than the Stickney soil, and are on foot slopes
• The poorly drained Hoven and Plankinton soils in basins
• The excessively drained Talmo soils on shoulder slopes
Similar inclusions:
• Soils that are similar to the Java soil but have lime at or near the surface
• Areas of Java soils that have scattered stones on the surface
• Soils that are similar to the Prosper soil but have more clay and less sand in the subsoil

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Poorly suited
Management concerns: Water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, including grasses and legumes in the cropping system, and using grassed waterways help to control erosion and conserve moisture.

Interpretive Groups

Land capability classification: Java—IVe-3; Glenham—IIIe-2; Prosper—IIe-3
Range site: Java—Silty; Glenham—Silty; Prosper—Silty
Windbreak suitability group: Java—8; Glenham—3; Prosper—1
Pasture suitability group: Java—G; Glenham—F; Prosper—K

JsA—Jerauld-Slickspots complex, 0 to 4 percent slopes

Composition

Jerauld and similar soils: 65 to 70 percent
Slickspots: 20 to 30 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Jerauld—foot slopes; Slickspots—the lower foot slopes
Slope range: Jerauld—0 to 4 percent; Slickspots—0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 25 acres

Typical Profile

Jerauld

Surface layer:
0 to 2 inches—grayish brown loam

Subsurface layer:
2 to 5 inches—gray loam

Subsoil:
5 to 10 inches—dark grayish brown clay loam
10 to 17 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts
17 to 33 inches—light brownish gray, calcareous clay loam that has accumulations of gypsum and other salts

Underlying layer:
33 to 60 inches—light yellowish brown, calcareous clay loam that has accumulations of gypsum and other salts

Characteristics of Slickspots

- A light gray, dispersed crust and dense, massive underlying material
- Accumulations of visible salts at or near the surface
- Barren or nearly barren of vegetation

Soil Properties and Qualities

Drainage class: Jerauld—moderately well drained; Slickspots—moderately well drained
Depth to bedrock: Jerauld—very deep; Slickspots—very deep
Depth to contrasting parent material: Jerauld—more than 60 inches; Slickspots—more than 60 inches
Depth to a high water table: Jerauld—3.5 to 5 feet; Slickspots—3.0 to 5 feet
Flooding: Jerauld—none; Slickspots—none
Ponding: Jerauld—none; Slickspots—none
Permeability: Jerauld—very slow; Slickspots—very slow
Available water capacity: Jerauld—moderate; Slickspots—low
Organic matter content: Jerauld—moderately low; Slickspots—low
Rate of surface runoff: Jerauld—medium; Slickspots—medium
Other properties: The Jerauld soil and Slickspots have a sodium-affected subsoil and a high content of salts.

Inclusions

Contrasting inclusions:
- Cavo soils, which have salts at a depth of more than 16 inches and are on foot slopes
- Stickney soils, which have a less dense sodium-affected subsoil, have salts at a depth of more than 16 inches, and are on upper foot slopes
- The poorly drained Hoven soils in basins

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Jerauld—the sodium-affected subsoil, which adversely affects the availability of plant nutrients, and the slow water intake rate; Slickspots—the sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), the slow water intake rate, and the very low available water capacity
Management measures:
- Proper grazing management helps to maintain plant vigor, conserve moisture, control erosion, and maintain tilth.

Interpretive Groups

Land capability classification: Jerauld—VIs-1; Slickspots—VIIIs-2
Range site: Jerauld—Thin Claypan; Slickspots—Not assigned
Windbreak suitability group: Jerauld—10; Slickspots—10
Pasture suitability group: Jerauld—NS; Slickspots—NS

Ko—Kolls clay

Composition

Kolls and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Plains

Landform position: Basins
Slope range: 0 to 1 percent
Shape of areas: Elliptical or oblong
Size of areas: 5 to 55 acres

Typical Profile

Surface layer:
0 to 2 inches—dark gray clay

Subsoil:
2 to 16 inches—dark gray, calcareous clay
16 to 29 inches—gray, calcareous clay
29 to 39 inches—gray, calcareous clay that has accumulations of gypsum

Underlying layer:
39 to 60 inches—grayish brown, calcareous clay that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: 0 to 1.5 feet
Flooding: None
Ponding: Frequent for long periods
Permeability: Very slow
Available water capacity: Moderate
Organic matter content: Moderate
Rate of surface runoff: Negligible

Inclusions

Contrasting inclusions:
• Hoven soils, which have a sodium-affected subsoil and are on the outer edges of mapped areas
• The well drained Promise soils on adjacent foot slopes

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Wetness, soil compaction
Management measures:
• Proper grazing management helps to maintain plant vigor.
• Restricting grazing during wet periods helps to minimize soil compaction.

Interpretive Groups

Land capability classification: Vw-4
Range site: Closed Depression
Windbreak suitability group: 10
Pasture suitability group: B2

Lc—Lawet loam

Composition

Lawet and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Flood plains
Landform position: Low flood plains
Slope range: 0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 5 to 80 acres

Typical Profile

Surface layer:
0 to 7 inches—dark gray, calcareous loam

Transitional layer:
7 to 13 inches—gray, calcareous loam

Subsoil:
13 to 23 inches—light brownish gray, calcareous sandy clay loam
23 to 33 inches—gray, calcareous silty clay loam
33 to 46 inches—light brownish gray, calcareous clay loam

Underlying layer:
46 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: 1 to 2 feet
Flooding: Rare
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Moderate
Rate of surface runoff: Low
Other properties: The soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The somewhat excessively drained Delmont soils on slightly higher parts of the landscape
Similar inclusions:
• Soils that have more clay and less sand in the subsoil
• Soils that do not have lime in the surface layer

Use and Management

Cropland and rangeland

Main crops: Wheat and barley
Suitability for cropland: Poorly suited
Management concerns: Wetness, wind erosion, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
• During wet years, this soil is better suited to crops that are planted late in the season.
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.
• Maintaining the existing drainage system helps to remove excess water.

Interpretive Groups

Land capability classification: IVw-1
Range site: Subirrigated
Windbreak suitability group: 2
Pasture suitability group: B1

Ma—Macken silty clay loam

Composition

Macken and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Till plains
Landform position: Basins
Slope range: 0 to 1 percent
Shape of areas: Elliptical or oblong
Size of areas: 5 to 400 acres

Typical Profile

Surface layer:
0 to 4 inches—dark gray, mottled silty clay loam

Subsoil:
4 to 34 inches—gray silty clay
34 to 46 inches—grayish brown, calcareous silty clay
46 to 60 inches—light brownish gray, mottled, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: 0.5 foot above to 1.0 feet below the surface
Flooding: None
Ponding: Frequent for long periods
Permeability: Slow
Available water capacity: Moderate
Organic matter content: Moderate
Rate of surface runoff: Negligible

Inclusions

Contrasting inclusions:
• Hoven soils, which have a sodium-affected subsoil and are on the outer edges of mapped areas
Similar inclusions:
• Soils that do not have lime within a depth of 40 inches

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Wetness, soil compaction
Management measures:
• Proper grazing management helps to maintain plant vigor.
• Restricting grazing during wet periods helps to minimize soil compaction.

Interpretive Groups

Land capability classification: Vw-4
Range site: Closed Depression
Windbreak suitability group: 10
Pasture suitability group: B2

Mb—Macken silty clay loam, ponded

Composition

Macken and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Till plains
Landform position: Basins
Slope range: 0 to 1 percent
Shape of areas: Elliptical or oblong
Size of areas: 10 to 500 acres

Typical Profile

Surface layer:
0 to 4 inches—dark gray, mottled silty clay loam

Subsoil:
4 to 34 inches—gray silty clay
34 to 46 inches—grayish brown, calcareous silty clay
46 to 60 inches—light brownish gray, mottled, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Very poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: 3 feet above to 1 foot below the surface
Flooding: None
Ponding: Frequent for very long periods
Permeability: Slow
Available water capacity: Moderate
Organic matter content: Moderate
Rate of surface runoff: Negligible

Inclusions

Contrasting inclusions:
• Hoven soils, which have a sodium-affected subsoil and are on the outer edges of mapped areas
Similar inclusions:
• Soils that do not have lime within a depth of 40 inches

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Wetness
Management measures:
• This soil is best suited to use as habitat for wildlife (fig. 10).

Interpretive Groups

Land capability classification: VIIIw-1
Range site: Not assigned
Windbreak suitability group: 10
Pasture suitability group: NS

OaA—Oahe loam, 0 to 2 percent slopes

Composition

Oahe and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Outwash plains
Landform position: Summits and back slopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 17 inches—dark grayish brown loam
17 to 23 inches—grayish brown loam
23 to 33 inches—grayish brown, calcareous loam

Underlying layer:
33 to 60 inches—yellowish brown, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 20 to 40 inches over sand and gravel
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderate in the subsoil and very rapid in the underlying layer
Available water capacity: Moderate
Organic matter content: Moderate
Rate of surface runoff: Low

Inclusions

Contrasting inclusions:
• The somewhat excessively drained Delmont soils on shoulder slopes
• The poorly drained Plankinton soils in basins
• The moderately well drained Prosper soils on foot slopes
Similar inclusions:
• Soils that do not have gravelly material within a depth of 40 inches

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: The moderate available water capacity
Management measures:
• Minimizing tillage and leaving crop residue on the surface help to control erosion and conserve moisture.

Interpretive Groups

Land capability classification: IIIs-2
Range site: Silty
Windbreak suitability group: 6
Pasture suitability group: D1

Figure 10.—An area of Macken silty clay loam, ponded, used as habitat for wetland wildlife.

OdA—Oahe-Delmont loams, 0 to 2 percent slopes

Composition

Oahe and similar soils: 60 to 70 percent
Delmont and similar soils: 20 to 30 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Outwash plains
Landform position: Oahe—summits and back slopes; Delmont—shoulder slopes
Slope range: Oahe—0 to 2 percent; Delmont—0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Oahe

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 17 inches—dark grayish brown loam
17 to 23 inches—grayish brown loam

23 to 33 inches—grayish brown, calcareous loam

Underlying layer:
33 to 60 inches—yellowish brown, calcareous gravelly sand

Delmont

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 14 inches—dark grayish brown loam
14 to 17 inches—dark grayish brown, calcareous sandy loam

Underlying layer:
17 to 25 inches—olive gray, calcareous very gravelly loamy sand
25 to 60 inches—brown, calcareous very gravelly sand

Soil Properties and Qualities

Drainage class: Oahe—well drained; Delmont—somewhat excessively drained
Depth to bedrock: Oahe—very deep; Delmont—very deep
Depth to contrasting parent material: Oahe—20 to 40 inches over sand and gravel; Delmont—14 to 20 inches over sand and gravel
Depth to a high water table: Oahe—more than 6 feet; Delmont—more than 6 feet
Flooding: Oahe—none; Delmont—none
Ponding: Oahe—none; Delmont—none
Permeability: Oahe—moderate in the subsoil and very rapid in the underlying layer; Delmont—moderate in the subsoil and very rapid in the underlying layer
Available water capacity: Oahe—moderate; Delmont—low
Organic matter content: Oahe—moderate; Delmont—moderate
Rate of surface runoff: Oahe—low; Delmont—low

Inclusions

Contrasting inclusions:
• The poorly drained Hoven and Plankinton soils in basins
• The moderately well drained Jerauld soils, which have a sodium-affected subsoil and are on lower foot slopes
• The moderately well drained Prosper soils on foot slopes
Similar inclusions:
• Soils that are similar to the Oahe soil but do not have gravelly material within a depth of 40 inches

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: Oahe—the moderate available water capacity; Delmont—the low available water capacity
Management measures:
• Minimizing tillage and leaving crop residue on the surface help to control erosion and conserve moisture.

Interpretive Groups

Land capability classification: Oahe—IIIs-2; Delmont—IVs-1
Range site: Oahe—Silty; Delmont—Shallow To Gravel
Windbreak suitability group: Oahe—6; Delmont—6
Pasture suitability group: Oahe—D1; Delmont—D2

OkB—Oko clay loam, 2 to 6 percent slopes

Composition

Oko and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Summits and back slopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 450 acres

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown clay loam

Subsoil:
4 to 10 inches—dark grayish brown clay
10 to 34 inches—grayish brown, calcareous clay

Underlying layer:
34 to 41 inches—light brownish gray, calcareous clay
41 to 60 inches—light brownish gray, calcareous shale that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Deep or very deep
Depth to contrasting parent material: 40 to more than 60 inches over shale
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Slow
Available water capacity: Low
Organic matter content: Moderate
Rate of surface runoff: High

Inclusions

Contrasting inclusions:
- Cavo soils, which have a sodium-affected subsoil and are on foot slopes
- The poorly drained Hoven soils in basins
- The very fine Promise soils on foot slopes at the outer edges of mapped areas

Similar inclusions:
- Soils that have less clay in the subsoil than the Oko soil
- Areas of soils that do not have shale within a depth of 60 inches

Use and Management

Cropland

Main crops: Wheat, sorghum, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: Water erosion, slow water intake rate
Management measures:
- Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.
- Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: IIIe-4
Range site: Clayey
Windbreak suitability group: 4
Pasture suitability group: I

OkC—Oko clay loam, 6 to 9 percent slopes

Composition

Oko and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Moraines
Landform position: Summits and back slopes
Slope range: 6 to 9 percent
Shape of areas: Irregular
Size of areas: 5 to 150 acres

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown clay loam

Subsoil:
4 to 10 inches—dark grayish brown clay
10 to 34 inches—grayish brown, calcareous clay

Underlying layer:
34 to 41 inches—light brownish gray, calcareous clay
41 to 60 inches—light brownish gray, calcareous shale that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Deep or very deep
Depth to contrasting parent material: 40 to more than 60 inches over shale
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Slow
Available water capacity: Low
Organic matter content: Moderate
Rate of surface runoff: Very high

Inclusions

Contrasting inclusions:
- Cavo soils, which have a sodium-affected subsoil and are on foot slopes
- The very fine Promise soils on foot slopes at the outer edges of mapped areas

Similar inclusions:
- Soils that have less clay in the subsoil than the Oko soil
- Areas of soils that do not have shale within a depth of 60 inches

Use and Management

Cropland

Main crops: Wheat, sorghum, and alfalfa
Suitability for cropland: Poorly suited
Management concerns: Water erosion, slow water intake rate
Management measures:
- Minimizing tillage, leaving crop residue on the surface, including grasses and legumes in the cropping system, and using grassed waterways help to conserve moisture and control erosion.
- Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: IVe-4
Range site: Clayey
Windbreak suitability group: 4
Pasture suitability group: I

OkD—Oko clay loam, 9 to 20 percent slopes

Composition

Oko and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Shoulder slopes and back slopes
Slope range: 9 to 20 percent
Shape of areas: Irregular
Size of areas: 5 to 150 acres

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown clay loam

Subsoil:
4 to 10 inches—dark grayish brown clay
10 to 34 inches—grayish brown, calcareous clay

Underlying layer:
34 to 41 inches—light brownish gray, calcareous clay
41 to 60 inches—light brownish gray, calcareous shale that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Deep or very deep
Depth to contrasting parent material: 40 to more than 60 inches over shale
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Slow
Available water capacity: Low
Organic matter content: Moderate
Rate of surface runoff: Very high

Inclusions

Contrasting inclusions:
• The excessively drained Talmo soils on shoulder slopes
Similar inclusions:
• Soils that have less clay in the subsoil than the Oko soil
• Areas of soils that do not have shale within a depth of 60 inches

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Water erosion, slow water intake rate
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: VIe-4
Range site: Clayey
Windbreak suitability group: 10
Pasture suitability group: NS

OnA—Onita silt loam, 0 to 2 percent slopes

Composition

Onita and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Foot slopes
Slope range: 0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 5 to 100 acres

Typical Profile

Surface soil:
0 to 15 inches—dark gray silt loam

Subsoil:
15 to 28 inches—dark grayish brown silty clay loam
28 to 33 inches—grayish brown silty clay loam
33 to 42 inches—light brownish gray, calcareous silt loam
42 to 60 inches—light brownish gray and grayish brown, mottled, calcareous silt loam

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: High
Rate of surface runoff: Medium
Other properties: Runoff water flows over areas of the soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• DeGrey soils, which have a sodium-affected subsoil and are on foot slopes

• The poorly drained Hoven and Plankinton soils in basins
Similar inclusions:
• Soils that have less clay and more silt in the subsoil than the Onita soil

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Conserving moisture
Management measures:
• Minimizing tillage and leaving crop residue on the surface help to conserve moisture.

Interpretive Groups

Land capability classification: IIc-3
Range site: Silty
Windbreak suitability group: 1
Pasture suitability group: K

Os—Onita-Hoven silt loams

Composition

Onita and similar soils: 45 to 55 percent
Hoven and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Onita—foot slopes; Hoven—basins
Slope range: Onita—0 to 2 percent; Hoven—0 to 1 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 100 acres

Typical Profile

Onita

Surface soil:
0 to 15 inches—dark gray silt loam

Subsoil:
15 to 28 inches—dark grayish brown silty clay loam
28 to 33 inches—grayish brown silty clay loam
33 to 42 inches—light brownish gray, calcareous silt loam
42 to 60 inches—light brownish gray and grayish brown, mottled, calcareous silt loam

Underlying layer:

Hoven

Surface layer:
0 to 3 inches—gray silt loam

Subsoil:
3 to 25 inches—dark gray silty clay
25 to 42 inches—dark gray, calcareous silty clay
42 to 55 inches—gray, calcareous silty clay

Underlying layer:
55 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Onita—moderately well drained; Hoven—poorly drained
Depth to bedrock: Onita—very deep; Hoven—very deep
Depth to contrasting parent material: Onita—more than 60 inches; Hoven—more than 60 inches
Depth to a high water table: Onita—2.5 to 6 feet; Hoven—1.0 foot above to 1.5 feet below the surface
Flooding: Onita—none; Hoven—none
Ponding: Onita—none; Hoven—occasional for long periods
Permeability: Onita—moderately slow; Hoven—very slow
Available water capacity: Onita—high; Hoven—moderate
Organic matter content: Onita—high; Hoven—moderate
Rate of surface runoff: Onita—medium; Hoven—negligible
Other properties: Runoff water flows over areas of the Onita soil during periods of rainfall or snowmelt; the Hoven soil has a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• The poorly drained Plankinton soils, which do not have a sodium-affected subsoil and are in basins
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes

Use and Management

Cropland

Main crops: Onita—wheat, corn, oats, and alfalfa; Hoven—wheat and oats
Suitability for cropland: Onita—well suited; Hoven—generally unsuited
Management concerns: Onita—conserving moisture; Hoven—the sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), the slow water intake rate, and wetness
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.
• Delaying tillage in areas of the Hoven soil during wet periods helps to minimize soil compaction.

Interpretive Groups

Land capability classification: Onita—IIc-3; Hoven—VIs-1
Range site: Onita—Loamy Overflow; Hoven—Closed Depression
Windbreak suitability group: Onita—1; Hoven—10
Pasture suitability group: Onita—K; Hoven—B2

OtB—Opal clay, 2 to 6 percent slopes

Composition

Opal and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Plains
Landform position: Summits and back slopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown clay

Subsoil:
5 to 13 inches—dark grayish brown, calcareous clay
13 to 19 inches—light brownish gray, calcareous clay
19 to 23 inches—light brownish gray, calcareous clay

Underlying layer:
23 to 28 inches—light brownish gray, calcareous clay
28 to 60 inches—olive gray, calcareous shale

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Moderately deep
Depth to contrasting parent material: 20 to 40 inches over shale
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Very slow
Available water capacity: Low
Organic matter content: Moderate
Rate of surface runoff: High

Inclusions

Contrasting inclusions:
• Capa soils, which have a sodium-affected subsoil and are on foot slopes
• The deep Promise soils on foot slopes
Similar inclusions:
• Soils that are more than 40 inches deep over shale
• Areas of soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Wheat, sorghum, sunflowers, and alfalfa
Suitability for rangeland: Fairly well suited
Management concerns: Wind and water erosion, the slow water intake rate, and low available water capacity
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: IIIe-4
Range site: Clayey
Windbreak suitability group: 4
Pasture suitability group: I

OtC—Opal clay, 6 to 9 percent slopes

Composition

Opal and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Dissected plains
Landform position: Summits and back slopes
Slope range: 6 to 9 percent
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown clay

Subsoil:
5 to 13 inches—dark grayish brown, calcareous clay
13 to 19 inches—light brownish gray, calcareous clay
19 to 23 inches—light brownish gray, calcareous clay

Underlying layer:
23 to 28 inches—light brownish gray, calcareous clay
28 to 60 inches—olive gray, calcareous shale

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Moderately deep
Depth to contrasting parent material: 20 to 40 inches over shale
Depth to a high water table: More than 6 feet

Flooding: None
Ponding: None
Permeability: Very slow
Available water capacity: Low
Organic matter content: Moderate
Rate of surface runoff: Very high

Inclusions

Contrasting inclusions:
• Capa soils, which have a sodium-affected subsoil and are on foot slopes
• The deep Promise soils on foot slopes
• The shallow Sansarc soils on shoulder slopes
Similar inclusions:
• Soils that are more than 40 inches deep over shale
• Areas of soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Wheat, sorghum, sunflowers, and alfalfa
Suitability for cropland: Poorly suited
Management concerns: Wind and water erosion, the slow water intake rate, and low available water capacity
Management measures:
• Minimizing tillage, leaving crop residue on the surface, including grasses and legumes in the cropping system, and using grassed waterways help to conserve moisture and control erosion.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: IVe-4
Range site: Clayey
Windbreak suitability group: 4
Pasture suitability group: I

OuD—Opal-Sansarc clays, 9 to 20 percent slopes

Composition

Opal and similar soils: 45 to 55 percent
Sansarc and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Dissected plains
Landform position: Opal—back slopes; Sansarc—shoulder slopes
Slope range: Opal—9 to 20 percent; Sansarc—9 to 20 percent
Shape of areas: Irregular
Size of areas: 10 to 300 acres

Typical Profile

Opal

Surface layer:
0 to 5 inches—dark grayish brown clay

Subsoil:
5 to 13 inches—dark grayish brown, calcareous clay
13 to 19 inches—light brownish gray, calcareous clay
19 to 23 inches—light brownish gray, calcareous clay

Underlying layer:
23 to 28 inches—light brownish gray, calcareous clay
28 to 60 inches—olive gray, calcareous shale

Sansarc

Surface layer:
0 to 4 inches—dark grayish brown clay

Transitional layer:
4 to 10 inches—grayish brown, calcareous clay

Underlying layer:
10 to 18 inches—light brownish gray, calcareous clay
18 to 60 inches—light brownish gray, calcareous shale

Soil Properties and Qualities

Drainage class: Opal—well drained; Sansarc—well drained
Depth to bedrock: Opal—moderately deep; Sansarc—shallow
Depth to contrasting parent material: Opal—20 to 40 inches over shale; Sansarc—10 to 20 inches over shale
Depth to a high water table: Opal—more than 6 feet; Sansarc—more than 6 feet
Flooding: Opal—none; Sansarc—none
Ponding: Opal—none; Sansarc—none
Permeability: Opal—very slow; Sansarc—very slow
Available water capacity: Opal—low; Sansarc—very low
Organic matter content: Opal—moderate; Sansarc—moderately low
Rate of surface runoff: Opal—very high; Sansarc—very high
Other properties: The Sansarc soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The very deep Bullcreek soils on foot slopes on fans
• The very deep Gettys and Peno soils and the deep Oko soils, which developed in glacial till and are on shoulder slopes
• The excessively drained Talmo soils on shoulder slopes

Similar inclusions:
• Areas of Sansarc soils that have scattered stones on the surface

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Opal—wind and water erosion, the slow water intake rate, and low available water capacity; Sansarc—wind and water erosion, the slow water intake rate, the very low available water capacity, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Opal—VIe-4; Sansarc—VIe-12
Range site: Opal—Clayey; Sansarc—Shallow Clay
Windbreak suitability group: Opal—10; Sansarc—10
Pasture suitability group: Opal—NS; Sansarc—NS

Ow—Orthents, gravelly

Composition

Orthents, gravelly: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Outwash plains and moraines
Landform position: Summits, shoulder slopes, and back slopes
Slope range: 0 to 60 percent
Shape of areas: Irregular
Size of areas: 5 to 30 acres

Typical Profile

Surface layer:
0 to 10 inches—light colored, calcareous gravelly loam

Underlying layer:
10 to 60 inches—gravelly loamy sand to very gravelly sand

Soil Properties and Qualities

Drainage class: Excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 0 to 10 inches over gravelly material
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Very rapid
Available water capacity: Very low
Organic matter content: Low
Rate of surface runoff: Medium

Inclusions

Contrasting inclusions:
• The somewhat excessively drained Delmont soils, the well drained Oahe and Orton soils, and the excessively drained Talmo soils in adjacent areas

Use and Management

Cropland, rangeland, or wildlife habitat

Suitability for cropland: Generally unsuited.
• Most areas consist of gravel pits that are used mainly as a source of sand or gravel for construction purposes.
• Some areas provide limited habitat for wildlife.
• Abandoned gravel pits can be restored to range, tame pasture, or cropland if reclamation measures are applied.
Management concerns: Water erosion, soil fertility, and the very low available water capacity
Management measures:
• Shaping the area helps to minimize the slope; the mounds of overburden can be used as topsoil dressing.
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.
• Applying fertilizer as needed helps to establish the range or pasture plantings.

Interpretive Groups

Land capability classification: VIIIs-2
Range site: Not assigned
Windbreak suitability group: 10
Pasture suitability group: NS

OxD—Orton-Talmo loams, 9 to 25 percent slopes

Composition

Orton and similar soils: 50 to 60 percent
Talmo and similar soils: 35 to 40 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Moraines
Landform position: Orton—back slopes; Talmo—shoulder slopes
Slope range: Orton—9 to 25 percent; Talmo—9 to 25 percent
Shape of areas: Irregular

Size of areas: 5 to 100 acres

Typical Profile

Orton

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 12 inches—brown loam
12 to 26 inches—brown, calcareous, stratified loam and sandy loam

Underlying layer:
26 to 60 inches—pale brown, calcareous gravelly sand

Talmo

Surface layer:
0 to 4 inches—dark grayish brown loam

Transitional layer:
4 to 7 inches—dark gray, calcareous gravelly loam

Underlying layer:
7 to 20 inches—pale brown, calcareous very gravelly sand
20 to 60 inches—yellowish brown, calcareous very gravelly sand

Soil Properties and Qualities

Drainage class: Orton—well drained; Talmo—excessively drained
Depth to bedrock: Orton—very deep; Talmo—very deep
Depth to contrasting parent material: Orton—20 to 40 inches over sand and gravel; Talmo—7 to 14 inches over sand and gravel
Depth to a high water table: Orton—more than 6 feet; Talmo—more than 6 feet
Flooding: Orton—none; Talmo—none
Ponding: Orton—none; Talmo—none
Permeability: Orton—moderate in the subsoil and very rapid in the underlying layer; Talmo—very rapid
Available water capacity: Orton—low; Talmo—low
Organic matter content: Orton—moderate; Talmo—moderate
Rate of surface runoff: Orton—high; Talmo—medium

Inclusions

Contrasting inclusions:
• Delmont soils, which are 14 to 20 inches deep over gravelly material and are on shoulder slopes
• Oahe soils, which have less sand and gravel in the upper 20 inches than the major soils and are on back slopes
• Gettys and Peno soils, which formed in glacial till and are on shoulder slopes
• The moderately deep Opal soils, which have shale at a depth of 20 to 40 inches and are on back slopes
Similar inclusions:
• Areas of Talmo soils that have a surface layer of gravelly loam

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Water erosion, low available water capacity
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Orton—VIe-6; Talmo—VIs-4
Range site: Orton—Sandy; Talmo—Very Shallow
Windbreak suitability group: Orton—10; Talmo—10
Pasture suitability group: Orton—NS; Talmo—NS

PgD—Peno-Gettys complex, 9 to 25 percent slopes

Composition

Peno and similar soils: 55 to 65 percent
Gettys and similar soils: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Peno—back slopes; Gettys—shoulder slopes
Slope range: Peno—9 to 25 percent; Gettys—9 to 25 percent
Shape of areas: Elongated or irregular
Size of areas: 5 to 200 acres

Typical Profile

Peno

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 9 inches—dark grayish brown clay loam
9 to 45 inches—grayish brown, calcareous clay loam

Underlying layer:
45 to 60 inches—light brownish gray, calcareous clay loam

Gettys

Surface layer:
0 to 3 inches—dark grayish brown, calcareous clay loam

Subsoil:
3 to 10 inches—grayish brown, calcareous clay loam
10 to 24 inches—light brownish gray, calcareous clay loam

Underlying layer:
24 to 43 inches—light brownish gray, calcareous clay loam
43 to 60 inches—light brownish gray, calcareous clay that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Peno—well drained; Gettys—well drained
Depth to bedrock: Peno—very deep; Gettys—very deep
Depth to contrasting parent material: Peno—more than 60 inches; Gettys—more than 60 inches
Depth to a high water table: Peno—more than 6 feet; Gettys—more than 6 feet
Flooding: Peno—none; Gettys—none
Ponding: Peno—none; Gettys—none
Permeability: Peno—slow; Gettys—slow
Available water capacity: Peno—moderate; Gettys—moderate
Organic matter content: Peno—moderate; Gettys—moderately low
Rate of surface runoff: Peno—very high; Gettys—very high
Other properties: The Gettys soil has a high content of lime.

Inclusions

Contrasting inclusions:
- The moderately well drained Onita soils on foot slopes
- The excessively drained Talmo soils on shoulder slopes

Similar inclusions:
- Areas of Gettys soils that have scattered stones on the surface

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Peno—water erosion and the slow water intake rate; Gettys—water erosion, the slow water intake rate, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
- Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Peno—VIe-3; Gettys—VIe-3
Range site: Peno—Clayey; Gettys—Thin Upland
Windbreak suitability group: Peno—10; Gettys—10
Pasture suitability group: Peno—NS; Gettys—NS

Pk—Plankinton silt loam

Composition

Plankinton and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Till plains
Landform position: Basins
Slope range: 0 to 1 percent
Shape of areas: Elliptical or oblong
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 3 inches—dark gray silt loam

Subsurface layer:
3 to 8 inches—light gray, mottled silt loam

Subsoil:
8 to 16 inches—gray silty clay
16 to 29 inches—dark gray silty clay
29 to 40 inches—olive gray, mottled, calcareous silty clay loam
40 to 51 inches—gray, mottled, calcareous clay

Underlying layer:
51 to 60 inches—light yellowish brown, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: 1 foot above to 1 foot below the surface
Flooding: None
Ponding: Occasional for long periods
Permeability: Very slow
Available water capacity: High
Organic matter content: High
Rate of surface runoff: Negligible

Inclusions

Contrasting inclusions:
- Hoven soils, which have a sodium-affected subsoil and are on the outer edges of mapped areas
- The moderately well drained Onita and Prosper soils on adjacent foot slopes
- The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
- Tetonka soils, which have a thicker surface layer and are in the center of mapped areas

Similar inclusions:
• Soils that do not have lime within a depth of 50 inches

Use and Management

Cropland

Main crops: Wheat and oats
Suitability for cropland: Poorly suited
Management concerns: Wetness
Management measures:
• During most years, this soil is better suited to crops that are planted late in the season.
• Deferring tillage when the soil is wet helps to minimize soil compaction.
• Maintaining the existing drainage system helps to remove excess water.

Interpretive Groups

Land capability classification: IVw-1
Range site: Closed Depression
Windbreak suitability group: 10
Pasture suitability group: B2

PrA—Promise silty clay, 0 to 2 percent slopes

Composition

Promise and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Plains
Landform position: The lower back slopes and foot slopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 350 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown silty clay

Subsoil:
8 to 27 inches—grayish brown, calcareous clay

Underlying layer:
27 to 43 inches—grayish brown, calcareous clay that has accumulations of gypsum in the lower part
43 to 60 inches—grayish brown, calcareous silty clay and silty clay loam that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Deep or very deep
Depth to contrasting parent material: 40 to more than 60 inches over shale
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Very slow
Available water capacity: Moderate
Organic matter content: Moderate
Rate of surface runoff: Medium

Inclusions

Contrasting inclusions:
• The moderately well drained, sodium-affected Capa soils on foot slopes
• The moderately well drained Carter soils on foot slopes
• The poorly drained Hoven and Kolls soils in basins
• The moderately deep Opal soils on back slopes
Similar inclusions:
• Areas of soils that have a surface layer of silty clay loam

Use and Management

Cropland

Main crops: Wheat, sorghum, sunflowers, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: Wind erosion, slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control wind erosion.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration and helps to maintain tilth.

Interpretive Groups

Land capability classification: IIIs-3
Range site: Clayey
Windbreak suitability group: 4
Pasture suitability group: I

PrB—Promise silty clay, 2 to 6 percent slopes

Composition

Promise and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Plains
Landform position: The lower back slopes and foot slopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 10 to 300 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown silty clay

Subsoil:
8 to 27 inches—grayish brown, calcareous clay

Underlying layer:
27 to 43 inches—grayish brown, calcareous clay that has accumulations of gypsum in the lower part
43 to 60 inches—grayish brown, calcareous silty clay and silty clay loam that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Deep or very deep
Depth to contrasting parent material: 40 to more than 60 inches over shale
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Very slow
Available water capacity: Moderate
Organic matter content: Moderate
Rate of surface runoff: High

Inclusions

Contrasting inclusions:
• The moderately well drained, sodium-affected Capa soils on foot slopes
• The moderately well drained Carter soils on foot slopes
• The poorly drained Hoven and Kolls soils in basins
• The moderately deep Opal soils on back slopes
Similar inclusions:
• Areas of soils that have a surface layer of silty clay loam

Use and Management

Cropland

Main crops: Wheat, sorghum, sunflowers, and alfalfa (fig. 11)
Suitability for cropland: Fairly well suited
Management concerns: Wind and water erosion, slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and control erosion.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration and helps to maintain tilth.

Interpretive Groups

Land capability classification: IIIe-4
Range site: Clayey
Windbreak suitability group: 4
Pasture suitability group: I

Ps—Prosper loam

Composition

Prosper and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Till plains
Landform position: Foot slopes
Slope range: 0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 5 to 100 acres

Typical Profile

Surface soil:
0 to 13 inches—dark gray loam

Subsoil:
13 to 28 inches—dark grayish brown silty clay loam
28 to 36 inches—light brownish gray, calcareous clay loam

Underlying layer:
36 to 60 inches—pale yellow, calcareous loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: 3.5 to 5 feet
Flooding: None
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: High
Rate of surface runoff: Low
Other properties: Runoff water flows over areas of the soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• The well drained Glenham soils on adjacent back slopes
• The poorly drained Plankinton and Tetonka soils in basins

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Conserving moisture

Figure 11.—Stripcropping in an area of Promise silty clay, 2 to 6 percent slopes.

Management measures:
• Minimizing tillage and leaving crop residue on the surface help to conserve moisture.

Interpretive Groups

Land capability classification: IIc-3
Range site: Loamy Overflow
Windbreak suitability group: 1
Pasture suitability group: K

RaA—Raber loam, 0 to 2 percent slopes

Composition

Raber and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Summits and back slopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 10 inches—dark grayish brown clay loam
10 to 17 inches—grayish brown clay loam
17 to 41 inches—grayish brown, calcareous clay loam

Underlying layer:
41 to 60 inches—grayish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Slow
Available water capacity: High
Organic matter content: Moderate
Rate of surface runoff: Medium

Inclusions

Contrasting inclusions:
• The moderately well drained Cavo soils, which have a sodium-affected subsoil and are on lower foot slopes
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
• The moderately well drained Onita soils, which are dark to a depth of 20 inches and are on foot slopes

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: IIs-1
Range site: Clayey
Windbreak suitability group: 4
Pasture suitability group: E

RaB—Raber loam, 2 to 6 percent slopes

Composition

Raber and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Summits and back slopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 10 inches—dark grayish brown clay loam
10 to 17 inches—grayish brown clay loam
17 to 41 inches—grayish brown, calcareous clay loam

Underlying layer:
41 to 60 inches—grayish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Slow
Available water capacity: High
Organic matter content: Moderate
Rate of surface runoff: High

Inclusions

Contrasting inclusions:
• The moderately well drained Cavo soils, which have a sodium-affected subsoil and are on lower foot slopes
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
• The moderately well drained Onita soils, which are dark below a depth of 20 inches and are on foot slopes
• Eakin soils, which have less clay throughout the profile than the Raber soil and are on summits and back slopes
• Peno soils, which have lime within a depth of 12 inches and are on shoulder slopes

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Water erosion, slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: IIIe-3
Range site: Clayey
Windbreak suitability group: 4
Pasture suitability group: E

RcA—Raber-Cavo loams, 0 to 2 percent slopes

Composition

Raber and similar soils: 45 to 55 percent
Cavo and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Raber—summits and back slopes; Cavo—foot slopes
Slope range: Raber—0 to 2 percent; Cavo—0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Raber

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 10 inches—dark grayish brown clay loam
10 to 17 inches—grayish brown clay loam
17 to 41 inches—grayish brown, calcareous clay loam

Underlying layer:
41 to 60 inches—grayish brown, calcareous clay loam

Cavo

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsurface layer:
5 to 7 inches—grayish brown loam

Subsoil:
7 to 18 inches—dark grayish brown clay loam
18 to 29 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts

Underlying layer:
29 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Raber—well drained; Cavo—moderately well drained
Depth to bedrock: Raber—very deep; Cavo—very deep
Depth to contrasting parent material: Raber—more than 60 inches; Cavo—more than 60 inches
Depth to a high water table: Raber—more than 6 feet; Cavo—3.5 to 5 feet
Flooding: Raber—none; Cavo—none
Ponding: Raber—none; Cavo—none
Permeability: Raber—slow; Cavo—very slow
Available water capacity: Raber—high; Cavo—moderate
Organic matter content: Raber—moderate; Cavo—moderately low
Rate of surface runoff: Raber—medium; Cavo—medium
Other properties: The Cavo soil has a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• The poorly drained Hoven soils in basins
• Jerauld soils, which have salts within a depth of 16 inches and are on foot slopes
• Onita soils, which are dark below a depth of 20 inches and are on foot slopes
• Stickney soils, which have salts at a greater depth than the Cavo soil and are on foot slopes
Similar inclusions:
• Soils that are similar to the Cavo soil but do not have glacial till within a depth of 20 inches

Use and Management

Cropland

Main crops: Wheat, sorghum, barley, and alfalfa
Suitability for cropland: Well suited
Management concerns: Raber—water erosion, slow water intake rate; Cavo—the sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots, and the slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Raber—IIs-1; Cavo—IVs-2
Range site: Raber—Clayey; Cavo—Claypan
Windbreak suitability group: Raber—4; Cavo—9
Pasture suitability group: Raber—E; Cavo—C

RcB—Raber-Cavo loams, 2 to 6 percent slopes

Composition

Raber and similar soils: 50 to 60 percent
Cavo and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Raber—summits and back slopes; Cavo—foot slopes
Slope range: Raber—2 to 6 percent; Cavo—2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Raber

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 10 inches—dark grayish brown clay loam
10 to 17 inches—grayish brown clay loam
17 to 41 inches—grayish brown, calcareous clay loam

Underlying layer:
41 to 60 inches—grayish brown, calcareous clay loam

Cavo

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsurface layer:
5 to 7 inches—grayish brown loam

Subsoil:
7 to 18 inches—dark grayish brown clay loam
18 to 29 inches—grayish brown, calcareous clay loam that has accumulations of gypsum and other salts

Underlying layer:
29 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of gypsum and other salts

Soil Properties and Qualities

Drainage class: Raber—well drained; Cavo—moderately well drained
Depth to bedrock: Raber—very deep; Cavo—very deep
Depth to contrasting parent material: Raber—more than 60 inches; Cavo—more than 60 inches
Depth to a high water table: Raber—more than 6 feet; Cavo—3.5 to 5 feet
Flooding: Raber—none; Cavo—none
Ponding: Raber—none; Cavo—none
Permeability: Raber—slow; Cavo—very slow
Available water capacity: Raber—high; Cavo—moderate
Organic matter content: Raber—moderate; Cavo—moderately low
Rate of surface runoff: Raber—high; Cavo—high
Other properties: The Cavo soil has a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• Eakin soils, which have less clay throughout the profile than the major soils and are on summits and back slopes
• The poorly drained Hoven soils in basins
• Jerauld soils, which have salts within a depth of 16 inches and are on foot slopes
• Onita and Stickney soils, which have salts at a greater depth than the Cavo soil and are on foot slopes
Similar inclusions:
• Soils that are similar to the Cavo soil but do not have glacial till within a depth of 20 inches
• Stickney soils, which have salts at a greater depth than the Cavo soil and are on foot slopes

Use and Management

Cropland

Main crops: Wheat, sorghum, barley, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: Raber—water erosion, slow water intake rate; Cavo—the sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), the slow water intake rate, and water erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Raber—IIIe-3; Cavo—IVs-2
Range site: Raber—Clayey; Cavo—Claypan
Windbreak suitability group: Raber—4; Cavo—9
Pasture suitability group: Raber—E; Cavo—C

RpB—Raber-Peno loams, 2 to 6 percent slopes

Composition

Raber and similar soils: 55 to 65 percent

Peno and similar soils: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Raber—summits and back slopes; Peno—shoulder slopes
Slope range: Raber—2 to 6 percent; Peno—2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Raber

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 10 inches—dark grayish brown clay loam
10 to 17 inches—grayish brown clay loam
17 to 41 inches—grayish brown, calcareous clay loam

Underlying layer:
41 to 60 inches—grayish brown, calcareous clay loam

Peno

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 9 inches—dark grayish brown clay loam
9 to 45 inches—grayish brown, calcareous clay loam

Underlying layer:
45 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Raber—well drained; Peno—well drained
Depth to bedrock: Raber—very deep; Peno—very deep
Depth to contrasting parent material: Raber—more than 60 inches; Peno—more than 60 inches
Depth to a high water table: Raber—more than 6 feet; Peno—more than 6 feet
Flooding: Raber—none; Peno—none
Ponding: Raber—none; Peno—none
Permeability: Raber—slow; Peno—slow
Available water capacity: Raber—high; Peno—moderate
Organic matter content: Raber—moderate; Peno—moderate
Rate of surface runoff: Raber—high; Peno—high

Inclusions

Contrasting inclusions:
• The moderately well drained Cavo soils, which have a sodium-affected subsoil and are on lower foot slopes
• The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
• The moderately well drained Onita soils, which are dark to depth of more than 20 inches and are on foot slopes
• Eakin soils, which have less clay in the subsoil than the major soils and are on back slopes
• The poorly drained Hoven and Plankinton soils in basins

Similar inclusions:
• Soils that are similar to the Peno soil but have lime at or near the surface
• Areas of Peno soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Wheat, sorghum, barley, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: Water erosion, slow water intake rate
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Raber—IIIe-3; Peno—IIIe-12
Range site: Raber—Clayey; Peno—Clayey
Windbreak suitability group: Raber—4; Peno—4
Pasture suitability group: Raber—E; Peno—F

RpC—Raber-Peno loams, 6 to 9 percent slopes

Composition

Raber and similar soils: 55 to 60 percent
Peno and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Moraines
Landform position: Raber—back slopes; Peno—shoulder slopes
Slope range: Raber—6 to 9 percent; Peno—6 to 9 percent
Shape of areas: Elongated or irregular
Size of areas: 5 to 200 acres

Typical Profile

Raber

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 10 inches—dark grayish brown clay loam
10 to 17 inches—grayish brown clay loam
17 to 41 inches—grayish brown, calcareous clay loam

Underlying layer:
41 to 60 inches—grayish brown, calcareous clay loam

Peno

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 9 inches—dark grayish brown clay loam
9 to 45 inches—grayish brown, calcareous clay loam

Underlying layer:
45 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Raber—well drained; Peno—well drained
Depth to bedrock: Raber—very deep; Peno—very deep
Depth to contrasting parent material: Raber—more than 60 inches; Peno—more than 60 inches
Depth to a high water table: Raber—more than 6 feet; Peno—more than 6 feet
Flooding: Raber—none; Peno—none
Ponding: Raber—none; Peno—none
Permeability: Raber—slow; Peno—slow
Available water capacity: Raber—high; Peno—moderate
Organic matter content: Raber—moderate; Peno—moderate
Rate of surface runoff: Raber—high; Peno—high

Inclusions

Contrasting inclusions:
- The moderately well drained Cavo soils, which have a sodium-affected subsoil and are on lower foot slopes
- The moderately well drained Stickney soils, which have a sodium-affected subsoil and are on foot slopes
- The moderately well drained Onita soils, which are dark to depth of more than 20 inches and are on foot slopes
- Eakin soils, which have less clay in the subsoil and are on back slopes

Similar inclusions:
- Soils that are similar to the Peno soil but have lime at or near the surface
- Areas of Peno soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Wheat, sorghum, barley, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: Water erosion, slow water intake rate
Management measures:
- Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to conserve moisture, control erosion, and maintain tilth.
- Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Raber—IVe-3; Peno—IVe-3
Range site: Raber—Clayey; Peno—Clayey
Windbreak suitability group: Raber—4; Peno—4
Pasture suitability group: Raber—E; Peno—F

RrA—Ree loam, 0 to 2 percent slopes

Composition

Ree and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Terraces
Landform position: Summits and back slopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 25 acres

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown loam

Subsoil:
4 to 10 inches—dark grayish brown silty clay loam
10 to 19 inches—brown silty clay loam
19 to 31 inches—light yellowish brown clay loam
31 to 43 inches—light brownish gray, calcareous clay loam

Underlying layer:
43 to 60 inches—light brownish gray, calcareous loam, stratified with gravelly loam and gravelly sand

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderate
Available water capacity: High
Organic matter content: Moderate
Rate of surface runoff: Low

Inclusions

Contrasting inclusions:
• Oahe soils, which have gravelly material at a depth of 20 to 40 inches and are on back slopes

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Well suited
Management concerns: Conserving moisture
Management measures:
• Minimizing tillage and leaving crop residue on the surface help to conserve moisture.

Interpretive Groups

Land capability classification: IIc-2
Range site: Silty
Windbreak suitability group: 3
Pasture suitability group: F

RsF—Rock outcrop-Sansarc complex, 15 to 40 percent slopes

Composition

Rock outcrop: 65 to 70 percent
Sansarc and similar soils: 25 to 30 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Dissected plains
Landform position: Rock outcrop—shoulder slopes; Sansarc—back slopes
Slope range: Rock outcrop—15 to 40 percent; Sansarc—15 to 40 percent
Shape of areas: Irregular
Size of areas: 10 to 2,000 acres

Characteristics of the Rock Outcrop

• Eroding exposures of soft bedrock that are barren of vegetation
• In places 1 to 5 inches of loose, weathered material on the surface

Typical Profile

Sansarc

Surface layer:
0 to 4 inches—dark grayish brown clay

Transitional layer:
4 to 10 inches—grayish brown, calcareous clay

Underlying layer:
10 to 18 inches—light brownish gray, calcareous clay
18 to 60 inches—light brownish gray, calcareous shale

Soil Properties and Qualities

Drainage class: Rock outcrop—none; Sansarc—well drained
Depth to bedrock: Rock outcrop—none; Sansarc—shallow
Depth to contrasting parent material: Rock outcrop—0 to 1 inches over soft bedrock; Sansarc—10 to 20 inches over shale
Depth to a high water table: Rock outcrop—more than 6 feet; Sansarc—more than 6 feet
Flooding: Rock outcrop—none; Sansarc—none
Ponding: Rock outcrop—none; Sansarc—none
Permeability: Rock outcrop—very slow; Sansarc—very slow
Available water capacity: Rock outcrop—very low; Sansarc—very low
Organic matter content: Rock outcrop—low; Sansarc—moderately low
Rate of surface runoff: Rock outcrop—very high; Sansarc—very high
Other properties: The Sansarc soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The very deep Bullcreek soils on foot slopes on fans
• The very deep Gettys soils and the deep Oko soils, which developed in glacial till and are on shoulder slopes
• The moderately deep Opal soils on back slopes

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Rock outcrop—exposed areas of bedrock; Sansarc—water erosion, the slow water intake rate, the very low available water capacity, and the slope
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Rock outcrop—VIIIs-2; Sansarc—VIIe-8
Range site: Rock outcrop—Not assigned; Sansarc—Shallow Clay
Windbreak suitability group: Rock outcrop—10; Sansarc—10
Pasture suitability group: Rock outcrop—NS; Sansarc—NS

Figure 12.—An area of Sansarc-Opal clays, 15 to 40 percent slopes. All areas of this map unit are used as rangeland.

SbF—Sansarc-Opal clays, 15 to 40 percent slopes

Composition

Sansarc and similar soils: 60 to 70 percent
Opal and similar soils: 20 to 30 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Dissected plains (fig. 12)
Landform position: Sansarc—shoulder slopes; Opal—back slopes
Slope range: Sansarc—15 to 40 percent; Opal—15 to 25 percent
Shape of areas: Irregular
Size of areas: 20 to 2,000 acres

Typical Profile

Sansarc

Surface layer:
0 to 4 inches—dark grayish brown clay

Transitional layer:
4 to 10 inches—grayish brown, calcareous clay

Underlying layer:
10 to 18 inches—light brownish gray, calcareous clay
18 to 60 inches—light brownish gray, calcareous shale

Opal

Surface layer:
0 to 5 inches—dark grayish brown clay

Subsoil:
5 to 13 inches—dark grayish brown, calcareous clay
13 to 19 inches—light brownish gray, calcareous clay
19 to 23 inches—light brownish gray, calcareous clay

Underlying layer:
23 to 28 inches—light brownish gray, calcareous clay
28 to 60 inches—olive gray, calcareous shale

Soil Properties and Qualities

Drainage class: Sansarc—well drained; Opal—well drained
Depth to bedrock: Sansarc—shallow; Opal—moderately deep
Depth to contrasting parent material: Sansarc—10 to 20 inches over shale; Opal—20 to 40 inches over shale
Depth to a high water table: Sansarc—more than 6 feet; Opal—more than 6 feet
Flooding: Sansarc—none; Opal—none
Ponding: Sansarc—none; Opal—none
Permeability: Sansarc—very slow; Opal—very slow
Available water capacity: Sansarc—very low; Opal—low
Organic matter content: Sansarc—moderately low; Opal—moderate
Rate of surface runoff: Sansarc—very high; Opal—very high
Other properties: The Sansarc soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The very deep Bullcreek soils on foot slopes on fans
• The very deep Gettys and the deep Oko soils, which developed in glacial till and are on shoulder slopes
• The excessively drained Talmo soils, which have gravelly material at a depth of less than 14 inches and are on shoulder slopes
• Areas of rock outcrop on shoulder slopes in areas of the Sansarc soil
Similar inclusions:
• Areas of Sansarc soils that have scattered stones on the surface

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Sansarc—water erosion, the slow water intake rate, the very low available water capacity, and the slope; Opal—water erosion, the slow water intake rate, the low available water capacity, and the slope
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Sansarc—VIIe-8; Opal—VIe-4
Range site: Sansarc—Shallow Clay; Opal—Clayey
Windbreak suitability group: Sansarc—10; Opal—10
Pasture suitability group: Sansarc—NS; Opal—NS

StA—Stickney-Java loams, 0 to 4 percent slopes

Composition

Stickney and similar soils: 50 to 55 percent
Java and similar soils: 30 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Stickney—foot slopes; Java—shoulder slopes
Slope range: Stickney—0 to 2 percent; Java—1 to 4 percent
Shape of areas: Irregular
Size of areas: 5 to 175 acres

Typical Profile

Stickney

Surface layer:
0 to 6 inches—dark gray loam

Subsurface layer:
6 to 11 inches—gray silty clay loam

Transitional layer:
11 to 14 inches—gray and light brownish gray silty clay loam

Subsoil:
14 to 28 inches—gray silty clay
28 to 32 inches—grayish brown, calcareous silty clay

32 to 45 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of salts

Underlying layer:
45 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of salts

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Stickney—moderately well drained; Java—well drained
Depth to bedrock: Stickney—very deep; Java—very deep
Depth to contrasting parent material: Stickney—more than 60 inches; Java—more than 60 inches
Depth to a high water table: Stickney—3.5 to 5 feet; Java—more than 6 feet
Flooding: Stickney—none; Java—none
Ponding: Stickney—none; Java—none
Permeability: Stickney—slow; Java—moderately slow
Available water capacity: Stickney—high; Java—high
Organic matter content: Stickney—moderate; Java—moderately low
Rate of surface runoff: Stickney—medium; Java—medium
Other properties: The Stickney soil has a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• Cavo soils, which have a more dense, sodium-affected subsoil than the Stickney soil and are on foot slopes
• Jerauld soils, which have a more dense, sodium-affected subsoil than the Stickney soil, have salts at a depth of less than 16 inches, and are on lower foot slopes
• The well drained Glenham soils, which do not have lime within a depth of 10 inches and are on summits and back slopes
• The poorly drained Hoven and Plankinton soils in basins

Use and Management

Cropland

Main crops: Wheat, corn, oats, and alfalfa
Suitability for cropland: Fairly well suited
Management concerns: Stickney—the sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots, and the slow water intake rate; Java—water erosion
Management measures:
• Leaving crop residue on the surface, minimizing tillage, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.

Interpretive Groups

Land capability classification: Stickney—IIIs-1; Java—IIIe-12
Range site: Stickney—Clayey; Java—Silty
Windbreak suitability group: Stickney—4; Java—8
Pasture suitability group: Stickney—E; Java—G

SvA—Stickney-Java-Hoven complex, 0 to 4 percent slopes

Composition

Stickney and similar soils: 35 to 40 percent
Java and similar soils: 25 to 35 percent
Hoven and similar soils: 20 to 25 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Stickney—foot slopes; Java—shoulder slopes; Hoven—basins
Slope range: Stickney—0 to 2 percent; Java—1 to 4 percent; Hoven—0 to 1 percent
Shape of areas: Irregular
Size of areas: 10 to 650 acres

Typical Profile

Stickney

Surface layer:
0 to 6 inches—dark gray loam

Subsurface layer:
6 to 11 inches—gray silty clay loam

Transitional layer:
11 to 14 inches—gray and light brownish gray silty clay loam

Subsoil:
14 to 28 inches—gray silty clay
28 to 32 inches—grayish brown, calcareous silty clay
32 to 45 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of salts

Underlying layer:
45 to 60 inches—light brownish gray, mottled, calcareous clay loam that has accumulations of salts

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Hoven

Surface layer:
0 to 3 inches—gray silt loam

Subsoil:
3 to 25 inches—dark gray silty clay
25 to 42 inches—dark gray, calcareous silty clay
42 to 55 inches—gray, calcareous silty clay

Underlying layer:
55 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Stickney—moderately well drained; Java—well drained; Hoven—poorly drained
Depth to bedrock: Stickney—very deep; Java—very deep; Hoven—very deep
Depth to contrasting parent material: Stickney—more than 60 inches; Java—more than 60 inches; Hoven—more than 60 inches
Depth to a high water table: Stickney—3.5 to 5 feet; Java—more than 6 feet; Hoven—1.0 foot above to 1.5 feet below the surface
Flooding: Stickney—none; Java—none; Hoven—none
Ponding: Stickney—none; Java—none; Hoven—occasional for long periods
Permeability: Stickney—slow; Java—moderately slow; Hoven—very slow
Available water capacity: Stickney—high; Java—high; Hoven—moderate
Organic matter content: Stickney—moderate; Java—moderately low; Hoven—moderate
Rate of surface runoff: Stickney—medium; Java—medium; Hoven—negligible
Other properties: The Stickney and Hoven soils have a sodium-affected subsoil.

Inclusions

Contrasting inclusions:
• Cavo and Jerauld soils, which have a more dense, sodium-affected subsoil than the Stickney soil and are on foot slopes
• The well drained Glenham soils, which do not have lime within a depth of 10 inches and are on summits and back slopes
• The moderately well drained Onita and Prosper soils, which do not have a sodium-affected subsoil and are on foot slopes
• The poorly drained Plankinton and Tetonka soils, which do not have a sodium-affected subsoil and are in basins
Similar inclusions:
• Areas of Java soils that have scattered stones on the surface

Use and Management

Cropland

Main crops: Stickney and Java—wheat, barley, oats, and alfalfa; Hoven—wheat and barley
Suitability for cropland: Stickney and Java—fairly well suited; Hoven—generally unsuited
Management concerns: Stickney—the sodium-affected subsoil, which adversely affects plant growth by restricting the penetration of roots, and the slow water intake rate; Java—water erosion; Hoven—wetness, the sodium-affected subsoil (which adversely affects plant growth by restricting the penetration of roots), and the slow water intake rate
Management measures:
• Leaving crop residue on the surface, minimizing tillage, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and maintain tilth.
• Chiseling or subsoiling during dry periods increases the rate of water infiltration.
• Delaying tillage in areas of the Hoven soil during wet periods helps to minimize soil compaction.

Interpretive Groups

Land capability classification: Stickney—IIIs-1; Java—IIIe-12; Hoven—VIs-1
Range site: Stickney—Clayey; Java—Silty; Hoven—Closed Depression
Windbreak suitability group: Stickney—4; Java—8; Hoven—10
Pasture suitability group: Stickney—E; Java—G; Hoven—B2

TaE—Talmo loam, 9 to 25 percent slopes

Composition

Talmo and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Moraines
Landform position: Shoulder slopes and back slopes
Slope range: 9 to 25 percent
Shape of areas: Elongated or irregular
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 4 inches—dark grayish brown loam

Transitional layer:
4 to 7 inches—dark gray, calcareous gravelly loam

Underlying layer:
7 to 20 inches—pale brown, calcareous very gravelly sand
20 to 60 inches—yellowish brown, calcareous very gravelly sand

Soil Properties and Qualities

Drainage class: Excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 7 to 14 inches over sand and gravel
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Very rapid
Available water capacity: Low
Organic matter content: Moderate
Rate of surface runoff: Medium

Inclusions

Contrasting inclusions:
• The well drained Betts and Java soils, which formed in glacial till and are on back slopes
• The well drained Orton soils, which have gravelly material at a depth of 20 to 40 inches and are on back slopes
• The well drained, shallow Sansarc soils on back slopes
Similar inclusions:
• Areas of soils that have a surface layer of gravelly loam

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Water erosion, low available water capacity
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: VIs-4
Range site: Very Shallow
Windbreak suitability group: 10
Pasture suitability group: NS

TbA—Talmo sandy loam, 0 to 3 percent slopes

Composition

Talmo and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Outwash plains
Landform position: Summits and back slopes
Slope range: 0 to 3 percent
Shape of areas: Irregular
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 4 inches—dark grayish brown sandy loam

Transitional layer:
4 to 7 inches—dark gray, calcareous gravelly loam

Underlying layer:
7 to 20 inches—pale brown, calcareous very gravelly sand
20 to 60 inches—yellowish brown, calcareous very gravelly sand

Soil Properties and Qualities

Drainage class: Excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 7 to 14 inches over sand and gravel
Depth to a high water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Very rapid
Available water capacity: Low
Organic matter content: Moderately low
Rate of surface runoff: Very low

Inclusions

Contrasting inclusions:
• The poorly drained Lawet soils on low flood plains
Similar inclusions:
• Areas of soils that have a gravelly loam surface layer
• Areas of soils that are deeper than 14 inches over gravelly material

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Low available water capacity
Management measures:
• Proper grazing management helps to maintain plant vigor and conserve moisture.

Interpretive Groups

Land capability classification: VIs-4
Range site: Very Shallow
Windbreak suitability group: 10
Pasture suitability group: NS

TcF—Talmo, stony-Java loams, 9 to 40 percent slopes

Composition

Talmo and similar soils: 60 to 70 percent
Java and similar soils: 20 to 30 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Talmo—shoulder slopes; Java—back slopes
Slope range: Talmo—9 to 40 percent; Java—9 to 40 percent
Shape of areas: Elongated or irregular
Size of areas: 5 to 100 acres

Typical Profile

Talmo

Surface layer:
0 to 4 inches—dark grayish brown loam

Transitional layer:
4 to 7 inches—dark gray, calcareous gravelly loam

Underlying layer:
7 to 20 inches—pale brown, calcareous very gravelly sand
20 to 60 inches—yellowish brown, calcareous very gravelly sand

Java

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsoil:
4 to 9 inches—dark grayish brown clay loam
9 to 14 inches—grayish brown, calcareous clay loam
14 to 30 inches—light brownish gray, calcareous clay loam

Underlying layer:
30 to 60 inches—light yellowish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Talmo—excessively drained; Java—well drained
Depth to bedrock: Talmo—very deep; Java—very deep
Depth to contrasting parent material: Talmo—7 to 14 inches over sand and gravel; Java—more than 60 inches
Depth to a high water table: Talmo—more than 6 feet; Java—more than 6 feet
Flooding: Talmo—none; Java—none
Ponding: Talmo—none; Java—none
Permeability: Talmo—very rapid; Java—moderately slow
Available water capacity: Talmo—low; Java—high
Organic matter content: Talmo—moderate; Java—moderately low
Rate of surface runoff: Talmo—medium; Java—very high
Other properties: Scattered stones and boulders cover the surface in areas of the Talmo soil.

Inclusions

Contrasting inclusions:
• The moderately well drained Prosper soils on foot slopes
Similar inclusions:
• Areas of Talmo soils that have a gravelly loam surface layer
• Areas of soils that are deeper than 14 inches over gravelly material
• Areas of soils that are similar to the Java soil but have lime at or near the surface

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Talmo—water erosion, the low available water capacity, and excessive stones on the surface; Java—water erosion
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Talmo—VIIs-4; Java—VIIe-3
Range site: Talmo—Very Shallow; Java—Silty
Windbreak suitability group: Talmo—10; Java—10
Pasture suitability group: Talmo—NS; Java—NS

TdD—Talmo-Delmont loams, 3 to 15 percent slopes

Composition

Talmo and similar soils: 50 to 60 percent
Delmont and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Talmo—shoulder slopes; Delmont—back slopes
Slope range: Talmo—9 to 15 percent; Delmont—3 to 15 percent
Shape of areas: Irregular
Size of areas: 5 to 350 acres

Typical Profile

Talmo

Surface layer:
0 to 4 inches—dark grayish brown loam

Transitional layer:
4 to 7 inches—dark gray, calcareous gravelly loam

Underlying layer:
7 to 20 inches—pale brown, calcareous very gravelly sand
20 to 60 inches—yellowish brown, calcareous very gravelly sand

Delmont

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 14 inches—dark grayish brown loam
14 to 17 inches—dark grayish brown, calcareous sandy loam

Underlying layer:
17 to 25 inches—olive gray, calcareous very gravelly loamy sand
25 to 60 inches—brown, calcareous very gravelly sand

Soil Properties and Qualities

Drainage class: Talmo—excessively drained; Delmont—somewhat excessively drained
Depth to bedrock: Talmo—very deep; Delmont—very deep
Depth to contrasting parent material: Talmo—7 to 14 inches over sand and gravel; Delmont—14 to 20 inches over sand and gravel
Depth to a high water table: Talmo—more than 6 feet; Delmont—more than 6 feet
Flooding: Talmo—none; Delmont—none
Ponding: Talmo—none; Delmont—none
Permeability: Talmo—very rapid; Delmont—moderate in the subsoil and very rapid in the underlying layer
Available water capacity: Talmo—low; Delmont—low
Organic matter content: Talmo—moderate; Delmont—moderate
Rate of surface runoff: Talmo—low; Delmont—high

Inclusions

Contrasting inclusions:
• The well drained Betts and Java soils, which developed in glacial till and are on shoulder slopes
• Oahe soils, which do not have gravelly material within a depth of 20 inches and are on back slopes
• The moderately well drained Prosper soils on foot slopes
Similar inclusions:
• Areas of Talmo soils that have a surface layer of gravelly loam
• Areas of Talmo soils that have scattered stones on the surface

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Water erosion, low available water capacity
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Talmo—VIs-4; Delmont—VIe-5
Range site: Talmo—Very Shallow; Delmont—Shallow to Gravel
Windbreak suitability group: Talmo—10; Delmont—10
Pasture suitability group: Talmo—NS; Delmont—NS

Te—Tetonka silt loam

Composition

Tetonka and similar soils: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Till plains
Landform position: Basins
Slope range: 0 to 1 percent
Shape of areas: Elliptical or oblong
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 6 inches—dark gray silt loam

Subsurface layer:
6 to 10 inches—light gray, mottled silt loam

Subsoil:
10 to 15 inches—dark gray silty clay
15 to 40 inches—dark grayish brown silty clay
40 to 60 inches—light brownish gray, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: 1 foot above to 1 foot below the surface
Flooding: None
Ponding: Frequent for long periods
Permeability: Slow
Available water capacity: High
Organic matter content: High
Rate of surface runoff: Negligible

Inclusions

Contrasting inclusions:
• Hoven soils, which have a sodium-affected subsoil and are on the outer edges of mapped areas
Similar inclusions:
• Areas of soils that have a thinner surface layer than the Tetonka soil

Use and Management

Cropland

Main crops: Wheat and corn
Suitability for cropland: Poorly suited
Management concerns: Wetness
Management measures:
• During most years, this soil is better suited to crops that are planted late in the season.
• Deferring tillage when the soil is wet helps to minimize soil compaction.
• Maintaining the existing drainage system helps to remove excess water.

Interpretive Groups

Land capability classification: IVw-1
Range site: Wet Meadow
Windbreak suitability group: 10
Pasture suitability group: B2

Wd—Wendte silty clay, channeled

Composition

Wendte and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Flood plains
Landform position: Low flood plains
Slope range: 0 to 1 percent
Shape of areas: Elongated
Size of areas: 25 to 500 acres

Typical Profile

Surface layer:
0 to 5 inches—dark gray, calcareous silty clay

Underlying layer:
5 to 15 inches—dark gray and gray, calcareous silty clay and clay loam
15 to 60 inches—dark gray and grayish brown, calcareous, stratified clay and clay loam that have accumulations of gypsum

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to a high water table: 3.5 to 5 feet
Flooding: Occasional for brief periods
Ponding: None
Permeability: Slow
Available water capacity: Moderate
Organic matter content: Moderate
Rate of surface runoff: Very low
Other properties: The soil has a high content of lime and is generally dissected by a meandering channel.

Inclusions

Contrasting inclusions:
• Bullcreek soils, which are not stratified and are on adjacent foot slopes
• The moderately deep Opal soils on adjacent back slopes
• The well drained Promise soils on adjacent foot slopes

Use and Management

Cropland and rangeland

Suitability for cropland: Generally unsuited
Management concerns: Flooding, meandering channels that limit cultivation
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control streambank erosion.
• Restricting grazing during wet periods helps to minimize soil compaction.

Interpretive Groups

Land capability classification: VIw-1
Range site: Clayey Overflow
Windbreak suitability group: 4
Pasture suitability group: NS

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in providing the Nation's short- and long-range needs for food and fiber. Because the supply of high quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 3,870 acres in the survey area, or 0.7 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county. About 71,885 additional acres would meet the requirements for prime farmland if irrigated. The main crops grown in areas of this land are wheat, corn, oats, barley, sorghum, sunflowers, and alfalfa.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Soils that have limitations, such as a seasonal high water table, frequent flooding during the growing season, or inadequate rainfall, qualify for prime farmland only in areas where these limitations have been overcome by such measures as drainage, flood control measures, or irrigation. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in Hyde County. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. It can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, lawns, and trees and shrubs.

The soils in the county are assigned to various interpretive groups at the end of each map unit description and in some tables. The groups for each map unit also are shown under the heading "Interpretive Groups," which follows the tables at the back of this survey.

Crops, Pasture, and Hayland

General management needed on the cropland, pasture, and hayland in Hyde County is suggested in this section. The crops best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service, the Cooperative Extension Service, or from the South Dakota Agricultural Experiment Station at South Dakota State University.

Crops

Dennis F. Shoup, conservation agronomist, Natural Resources Conservation Service, helped prepare this section.

About 24 percent of the acreage in Hyde County is used for cultivated crops *(9)*. The major crops are spring wheat, winter wheat, corn, oats, barley, sorghum, and sunflowers. Spring wheat is the main cash crop in the county.

The soils in Hyde county have a good potential for increased crop production. Crop production could be increased considerably, in an environmentally acceptable manner, by extending the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology. The paragraphs that follow describe the major management concerns for cropland in the county. These concerns are water erosion, wind erosion, fertility, tilth, compaction, and sodium-affected soils.

Water erosion reduces productivity and results in sedimentation of streams and lakes. Productivity is reduced when the more fertile surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a thin surface layer, such as Java and Peno soils. Erosion also reduces the productivity of soils that tend to be droughty, such as Delmont and Henkin soils. When erosion occurs, sediment rich in nutrients and possibly pesticides enters streams and lakes. Measures that control erosion minimize the pollution of streams and lakes by sediment and preserve water quality for fish and

wildlife and for recreation and municipal uses. These measures also reduce the amount of fertilizer needed on cropland by preventing the removal of plant nutrients and applied pesticides.

A cropping system that keeps a plant cover on the surface for extended periods holds soil losses to an amount that does not reduce the productive capacity of the soils. If a plant cover cannot protect the soil, careful management of crop residue is essential. Minimizing tillage and leaving crop residue on the surface increase the rate of water infiltration, reduce the runoff rate, and help to control erosion.

Terraces and diversions help to control erosion by reducing the runoff rate and the length of slopes. They are most practical on very deep, well drained soils that have long, smooth slopes, such as Highmore and Promise soils. Contour farming and contour stripcropping also are effective on these soils. Some soils, such as Delmont and Opal soils, are poorly suited to terraces and diversions because of short, irregular slopes and an unfavorable subsoil that would be exposed in terrace channels.

The hazard of wind erosion is slight to severe on the soils in the county. The hazard is severe on soils having a surface layer of fine sandy loam, such as Henkin and Blendon soils. Soils that have a high content of clay in the surface layer, such as Bullcreek, Opal, and Promise soils, also are susceptible to wind erosion. Soils that have a high content of lime in the surface layer, such as Betts, Bullcreek, Egas, and Sansarc soils, are highly susceptible. Wind erosion can damage these soils in a few hours if winds are strong and the soils are dry and are not protected by a plant canopy or crop residue. Wind erosion can be controlled by an adequate plant cover, crop residue, stripcropping, and tillage methods that keep the surface rough. Windbreaks of suitable trees and shrubs and strips of unharvested crops are also effective in controlling wind erosion.

Information about the measures that control erosion on each kind of soil is contained in the South Dakota Technical Guide, available in the local office of the Natural Resources Conservation Service.

Knowledge of soil fertility levels can help in ascertaining the yields that can be obtained from the soil. A good nutrient management program can provide the nutrients needed by a given crop and thus can optimize yields. The nutrient management plan should be based on the type of soil, the supply of available moisture, the crop to be planted, a realistic yield goal, current soil fertility test levels, whether or not legumes have been planted or agricultural waste has been applied in the past 2 years, and the susceptibility of surface and ground water to nutrient pollution from the site. The plan should be developed annually. It should indicate the kinds and amounts of each nutrient needed, the field location, and the time and method of application. The Natural Resources Conservation Service, the South Dakota Cooperative Extension Service, and the South Dakota Agricultural Experiment Station at South Dakota State University can help in developing a nutrient management plan.

Soil tilth is an important factor affecting the germination of seeds and the infiltration of water into the soil. Soils with good tilth are granular and porous. Management can affect the tilth of a specific soil. In areas that are managed to promote good tilth, the rate of water infiltration and the water holding capacity are increased and seedling emergence and root development are improved. As a result, yields are higher than those in a poorly managed area of the same soil. Improving soil tilth also reduces the amount of horsepower required for tillage.

Soil compaction is an important management concern. It occurs when any weight on the soil pushes the soil particles together. If the surface layer or subsoil is compacted, aeration is impaired and it is more difficult for plant roots to push through the soil and obtain water. The factors that affect compaction include wetness and clayey textures in the surface layer and subsoil.

Good management can improve tilth and minimize compaction. This management includes growing high-residue crops in the crop rotation a high percentage of the time, deferring grazing and equipment use during wet periods, leaving as much residue as possible on or near the surface, and reducing the number of tillage passes required in a field. The timing of farming operations is critical. Compacted areas can be improved by ripping or deep plowing. Tilth and compaction are especially important management concerns on clayey soils, such as Opal and Promise soils, and on sodium-affected that have a claypan, such as Cavo and DeGrey soils.

Sodium-affected soils are characterized by a slow rate of water infiltration, are less productive than other soils because of a lower content of organic matter, and restrict root and water penetration because of a dense, compact subsoil. Properly timing tillage, minimizing tillage, and leaving crop residue on the surface help to maintain the content of organic matter and the tilth. Including grasses and legumes in the crop rotation helps to maintain the content of organic matter, soil fertility, and tilth. Chiseling and subsoiling when the soils are dry increase the rate of water infiltration.

Field crops that are suited to the soils and climate in Hyde County include both small grain and row crops. Spring and winter wheat are the main small grain crops. Corn and grain sorghum are the main row crops.

Very deep, well drained or moderately well drained soils are suited to all of the crops commonly grown in Hyde County. Examples include Eakin, Glenham, Highmore, and Raber soils. Delmont and other droughty soils are

better suited to early maturing small grain than to deeper rooted crops, such as corn, because they have porous underlying material that has a low water-holding capacity and limits the rooting depth of many plants. Promise and Opal are examples of soils that are better suited to winter wheat and grain sorghum than to corn.

Many of the very deep, well drained soils are suitable for irrigation. Examples include Glenham and Highmore soils. The main management concerns include providing the needed water quantity and quality for the plant in a timely and efficient manner, providing the plant with the necessary nutrients (discussed under the section on soil fertility), providing erosion-control measures, and controlling crop pests.

Water needs vary with the crop, the soil, the climate, and the irrigation system's efficiency. The Natural Resources Conservation Service, the South Dakota Cooperative Extension Service, and the Agricultural Experiment Station at South Dakota State University have resources available to assist operators in designing a good irrigation water management system for their fields.

Pasture and Hayland

David W. Schmidt, range conservationist, Natural Resources Conservation Service, helped prepare this section.

Pasture and hayland are areas used for the production of adapted domestic perennial forage plants to be grazed by livestock or harvested for hay. These forage plants can be either native or introduced species and can be seeded alone or in a mixture. Generally, they are established as part of a long-term forage program but may be established with legumes or grasses as part of a short-term crop rotation.

Currently, about 8 percent of the survey area is classified as pasture and hayland *(9)*. The pasture and hayland supply a portion of the forage for livestock. They include areas that once supported native vegetation but have been invaded by introduced tame grasses, such as smooth bromegrass, because of overgrazing. Managing many of these sites as native rangeland is no longer practical. Many areas in the county are producing well below their potential due to overgrazing, improper hayland management, and poor agronomic practices.

Proper pasture and hayland management techniques help to assure maximum sustained yields. Proper stocking rates allow the pasture plants to remain vigorous. Pastures that are overgrazed lose vigor because of the depleted root systems. If overgrazing continues, the plants eventually die and are replaced by less desirable species and by weeds.

Planned grazing systems that include periods of rest or deferment for the main pasture species help to improve plant vigor and improve production. Rest periods between periods of grazing allow the pasture plants to regrow and replenish their energy reserves. Haying at the proper stage of plant growth helps to maintain plant vigor. Generally, the plants should be hayed at the early to mid bloom stage.

Grazing pasture species at the proper stage of growth improves plant vigor and increases forage production. Grazing a plant before it has produced enough leaf material to replenish stored energy reserves reduces plant vigor and forage production. Generally, the plants should be allowed to grow to a height of 8 to 14 inches before they are grazed, depending on the species being managed. Allowing the plants to become too tall or mature before the initiation of grazing reduces the quality of the forage and somewhat reduces the quantity.

Allowing the plants to regrow before the first killing frost permits the plants to store enough energy reserves to survive the winter and initiate growth during the following spring. Forage production during the following year will improve. In addition, the regrowth will trap snow and thus increase the supply of soil moisture.

Matching plant species to the season of use is important. Pasture and hayland species can be divided into two broad categories—cool-season species and warm-season species. Cool-season species begin to grow in early spring and end growth in early summer. If adequate soil moisture is available, they may regrow again when temperatures cool in the fall. Warm-season species begin to grow in early summer. They produce the majority of their forage during the hot summer months. Examples of cool-season species are smooth bromegrass, intermediate wheatgrass, and alfalfa. Examples of warm-season species are big bluestem and switchgrass. The warm-season species provide nutritious forage for livestock during July and August. If a cool-season species is utilized during this period, reduced livestock performance will be the result.

In order to maintain optimum forage production, occasional renovation of pasture and hayland is needed. The amount of time that pasture and hayland remain productive depends on the plant species, the kind of soil, climatic factors, and management. Many of the tame species should be replaced once every 5 to 10 years. Native species, which are adapted to the site, generally remain productive for an extended period. The length of the productive period is highly dependent on the pasture and hayland management techniques that are used. The species selected for planting should be those that are suited to the soils and that meet the needs of the producer. Selecting improved varieties commonly increases forage production, improves the quality of the forage, helps to establish the stand, and increases the longevity of the stand.

Maintaining the fertility of the soil is imperative in

managing pasture and hayland. Basing the kinds and amounts of fertilizer to be applied on the results of soil tests reduces the threat of water contamination and assures economic feasibility. Applying the proper kinds and amounts of fertilizer increases forage production, increases the longevity of the stand, and improves the quality of the forage. When planted with grasses, legumes, such as alfalfa, commonly provide sufficient nitrogen to meet the needs of the grass species.

Weeds can often become a problem on pasture and hayland, mainly because of poor management. Overgrazing, poor fertility, and selection of species that are not suited to the site increase the extent of weeds. The weeds should be controlled within economical and environmental constraints.

Pasture and hayland yields are dependent on the variety of species, the site, previous management practices, soil fertility, and climatic factors. The yields can be optimized by using proper management techniques.

The soils are assigned to pasture suitability groups at the end of each description under the heading "Detailed Soil Map Units" and in the section "Interpretive Groups," which follows the tables in the back of this survey. The principal criteria used in assigning the soils to these groups are depth, drainage, texture, structure, permeability, available water capacity, landform position, and special internal features. The groups are described in the paragraphs that follow. The description of each group indicates the major hazards and limitations affecting the use of the soils in the group for hay and pasture. It also lists the forage species best suited to the group. The species listed were selected for their yield potential, their suitability to the site, their palatability, and the relative ease with which they can be established.

These descriptions can be used to help make decisions about land-use conversions and species selection. For more detailed information, consult the local office of the Natural Resources Conservation Service, the South Dakota Cooperative Extension Service, or the Agricultural Experiment Station at South Dakota State University.

The soils in the county are assigned to 13 different pasture suitability groups. The symbols for these groups are B1, B2, C, D1, D2, E, F, G, H, I, J, K, and NS.

Group B1. These soils have a high water table within the rooting zone. Excess moisture limits the choice of climatically adapted grasses to water-tolerant species.

The soils in this group are not artificially drained. An example is Lawet soils. The species best suited to these soils include creeping foxtail, reed canarygrass, and western wheatgrass. The major management concern is the soil compaction caused by haying or grazing when the soils are excessively wet. Timely deferment of grazing and haying can minimize compaction and improve plant vigor.

Group B2. These soils receive additional moisture because of runoff. Excess moisture limits the choice of climatically adapted grasses to water-tolerant species.

The soils in this group are not artificially drained. Examples are Hoven, Kolls, Macken, Plankinton, and Tetonka soils. The species best suited to these soils include creeping foxtail, reed canarygrass, and western wheatgrass. The major management concern is the soil compaction caused by haying or grazing when the soils are excessively wet. Timely deferment of grazing and haying can minimize compaction and improve plant vigor.

Group C. These soils have a claypan subsoil and generally have a high amount of soluble salts in the lower part of the subsoil. An unfavorable root zone limits the choice and productivity of climatically adapted grasses and legumes.

Typical soils include Carter, Cavo, and DeGrey soils. The species best suited to this group of soils include alfalfa, crested wheatgrass, green needlegrass, intermediate wheatgrass, pubescent wheatgrass, and western wheatgrass. The major management concerns are the accumulations of excess salt, soil compaction, and the inherent droughtiness of the site. Proper hayland management and proper grazing use, including deferred grazing programs, help to maintain a healthy plant community and minimize soil-related management problems. Applications of fertilizer to meet plant the nutrient needs of the plants also increase plant vigor and production.

Group D1. These soils have a moderately deep root zone and a less than optimum available water capacity, both of which limit the choice of climatically adapted grasses and legumes.

The soils in this group are excessively to somewhat poorly drained and are moderately deep over sand and gravel. An example is Oahe soils. The somewhat poorly drained soils and some of the moderately well drained soils have a short-duration water table and are calcareous at or near the surface. The species best suited to these soils include alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass. The major management concerns are droughtiness, which is caused by the moderate available water capacity, and the moderately deep rooting zone. Proper hayland management and proper grazing use, including deferred grazing programs, help to maintain plant vigor. Applications of fertilizer to meet plant the nutrient needs of the plants also increase plant vigor and production.

Group D2. These soils have a moderately deep root zone and a very low available water capacity, both of which limit the choice of climatically adapted grasses.

The soils in this group are excessively drained to moderately well drained and are shallow over sand and gravel. An example is Delmont soils. The species best suited to these soils include crested wheatgrass, western wheatgrass, and pubescent wheatgrass. The major management concerns on these sites are extreme droughtiness, which is caused by the low available water capacity, and the maintenance of the plant community. Proper hayland management and proper grazing use, including deferred grazing programs, help to maintain plant vigor and optimize plant production.

Group E. These soils have a high content of soluble salts in the underlying material. An unfavorable root zone limits the choice of climatically adapted grasses and legumes and their productivity.

Typical soils include Stickney and Walke soils. The species best suited to these soils include alfalfa, big bluestem, green needlegrass, intermediate wheatgrass, smooth bromegrass, and switchgrass. The major management concerns are the maintenance of plant vigor and soil tilth. Proper hayland management and proper grazing use, including deferred grazing programs, help to maintain plant vigor and soil tilth. Applications of fertilizer to meet plant the nutrient needs of the plants also increase plant vigor and production.

Group F. All climatically adapted grasses and legumes are suited to soils in this group, but bunch-type species are not recommended in areas that have slopes of 6 percent or more.

Typical soils are Bend, Eakin, Glenham, Highmore, Peno, Raber, and Ree soils. The species best suited to these soils include alfalfa, big bluestem, green needlegrass, intermediate wheatgrass, smooth bromegrass, and switchgrass. The major management concerns are the maintenance of plant vigor and the potential for erosion. Proper hayland management and proper grazing use, including deferred grazing programs, help to maintain plant vigor and soil tilth. Applications of fertilizer to meet plant the nutrient needs of the plants also increase plant vigor and production.

Group G. These soils are calcareous within a depth of 10 inches and are gently sloping to moderately steep. The slope, high content of lime, and the hazard of erosion limit the choice of climatically adapted grasses and legumes and their productivity.

Typical soils are Betts, Edwin, Gettys, and Java soils. The species best suited to these soils include alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass. The major management concerns are maintaining plant vigor and reducing erosion. Proper hayland management and proper grazing use, including deferred grazing programs, help to maintain plant vigor and provide sufficient cover to reduce erosion. Applications of fertilizer to meet plant the nutrient needs of the plants also increase plant vigor and production.

Group H. The hazard of erosion and an available water capacity that is less than optimum limit the choice of climatically adapted grasses and legumes and their productivity.

Typical soils are Blendon and Henkin soils. The species best suited to these soils include alfalfa, big bluestem, sand bluestem, intermediate wheatgrass, smooth bromegrass, and switchgrass. The major management concerns are the maintenance of plant vigor and the potential hazard of erosion. Proper hayland management and proper grazing use, including deferred grazing programs, help to maintain plant vigor and provide sufficient cover to reduce erosion. Applications of fertilizer to meet plant the nutrient needs of the plants also increase plant vigor and production.

Group I. These soils have an unfavorable rooting zone and a very slow water intake rate that limit the choice of climatically adapted grasses and legumes and their productivity.

Typical soils are Oko, Opal, Promise, and Wendte soils. The species best suited to these soils include alfalfa, green needlegrass, intermediate wheatgrass, smooth bromegrass, switchgrass, and western wheatgrass. The major management concerns are maintaining plant vigor and soil tilth. Soil compaction is a potential problem caused by haying or grazing when the soils are wet. Proper hayland management and proper grazing use, including deferred grazing programs, help to maintain plant vigor and soil tilth. Applications of fertilizer to meet plant the nutrient needs of the plants also increase plant vigor and production.

Group J. Excess salinity and alkalinity severely limit the choice of climatically adapted grasses and legumes and their productivity.

Typical soils are Durrstein and Egas soils. The species best suited to these soils include tall wheatgrass and western wheatgrass. The major management concern is maintaining the desirable plant community in areas of these salt-affected soils. Soil compaction is a potential problem caused by haying or grazing when the soils are saturated. Proper hayland management and proper grazing use, including deferred grazing programs, help to maintain plant vigor and ensure the survivability of the stand.

Group K. These soils receive additional moisture from runoff. All climatically adapted grasses and legumes are suited to these soils.

Typical soils are Bon, Onita, and Prosper soils. The

species best suited to these soils include alfalfa, big bluestem, green needlegrass, indiangrass, intermediate wheatgrass, western wheatgrass, smooth bromegrass, and switchgrass. The major management concerns are maintaining plant vigor and soil tilth. Proper hayland management and proper grazing use, including deferred grazing programs, help to maintain plant vigor and soil tilth. Applications of fertilizer to meet plant the nutrient needs of the plants also increase plant vigor and production.

Group NS. These soils are very shallow over gravel, shallow over bedrock, sandy and have a low content of organic matter, very strongly saline or alkaline, clayey and have a dense subsoil, stony or very stony, or ponded. Because of these severe limitations, the soils in this group are not recommended for pasture plantings.

Typical soils are Bullcreek, Capa, Hurley, Jerauld, Sansarc, and Talmo soils. No species are recommended for pasture plantings in areas of these soils.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, extension agents, and research scientists. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include a cropping sequence that makes efficient use of the available moisture and provides erosion control; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of all essential plant elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops are small. The local office of the Natural Resources Conservation Service, the South Dakota Cooperative Extension Service, or the Agricultural Experiment Station at South Dakota State University can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit *(8)*. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations or hazards that restrict their use.

Class II soils have moderate limitations or hazards that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations or hazards that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations or hazards that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations or hazards, impractical to remove, that limit their use.

Class VI soils have severe limitations or hazards that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations or hazards that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations or hazards that nearly preclude their use for agricultural production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation; *s* shows that the soil is limited mainly because it is shallow, droughty, saline, or stony; and *c*, used in only some parts

of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-2 or IIIe-12. The capability units are not numbered consecutively because those represented in the county do not include all of the units in the statewide system.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the section "Interpretive Groups," which follows the tables at the back of the survey.

Rangeland

David W Schmidt, range conservationist, Natural Resources Conservation Service, helped prepare this section.

Rangeland consists of areas that have native vegetation suitable for grazing or browsing. It includes areas where the native vegetation has been reestablished. The vegetation mainly consists of grasses, grasslike plants, forbs or shrubs. The amount and kind of native vegetation growing in any one area are influenced by the type of soil, topography, climate, past use, and management.

Before the first permanent settlers arrived, all of the county consisted of rangeland. Currently, about 64 percent of the county supports native vegetation *(9)*. This rangeland supplies a major portion of the forage for the livestock in the county. Approximately 84 percent of the farm and ranch income in the county is derived from the sale of livestock and livestock products *(12)*. Most of the ranches are cow-calf operations. Some are yearling operations, and some ranchers combine their cow herds with yearlings. This practice permits greater flexibility in adjusting livestock numbers during periods of drought. Sheep are found in limited numbers throughout the county, and they are often found in combination with cow herds. The rangeland is generally grazed from May to October. The forage provided by rangeland is generally supplemented by crop residue and tame pasture plants, such as intermediate wheatgrass and smooth bromegrass. In winter, the forage is supplemented by protein concentrates and by hay.

Hyde County is part of the mixed grass prairie. The native vegetation is dominated by mid grasses, such as western wheatgrass, and forbs, such as prairie coneflower. Tall grasses, such as big bluestem, and short grasses, such as blue grama, are interspersed with the mid grass plants. The mixed grass prairie consists of cool- and warm-season plants, which provide good quality forage throughout the growing season. The cool-season plants grow mostly during April, May, and June, and they include plants such as green needlegrass. The warm-season plants grow mostly during June, July, and August, and they include plants such as big bluestem. The cool-season grasses may start growing again in September and October if the rainfall in autumn is adequate.

The native vegetation in many parts of the county is producing below its potential because of past misuse. The tall grasses and some of the mid grasses have been replaced by less desirable plants. In many areas of the county, the past misuse of the native vegetation has led to an invasion of cool-season tame grasses, mostly smooth bromegrass. The result is a total reduction of available forage. In most areas, however, enough of the original plants remain for good grazing management to reestablish the high quality native plants.

Range Sites and Condition Classes

Different types of soil vary in their capacity to produce native vegetation. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, the content of salts, and a seasonal high water table are also important. Soils that produce approximately the same kinds, amounts, and proportions of native vegetation make up a range site. The potential native vegetation on a range site is the stabilized plant community that the site is capable of producing. It consists of the plants that were growing on the site when the region was settled. This plant community maintains itself and changes very little as long as the environment remains unchanged. The relationship between soils and vegetation was ascertained during this survey; thus range sites generally can be determined directly from the soil maps.

The plants within the native plant community can be grouped as decreasers, increasers, or invaders, depending on their response to grazing pressure. Decreasers are plants that respond to overgrazing by decreasing in abundance. They generally are the most productive plants and the ones most preferred by the grazing animals. Increasers are plants that respond to grazing pressure, at least initially, by increasing in amount as the more desirable decreaser plants become less abundant. Increasers generally are less productive and less preferred by the grazing animal. Invaders are plants that are not part of the original plant community but invade because of some type kind of disturbance or because of

continued overgrazing. Some invader plants have little or no value for grazing.

Because plants do not respond in the same manner to different influences, a plant may be a decreaser on some range sites but an increaser on others. A cool-season plant, for example, may be a decreaser if the site is grazed only during the spring but would be an increaser if the same site were grazed only during the summer. The reverse would be true for the warm-season plants. Restricting grazing to the spring would cause the warm-season plants to increase in abundance, and restricting grazing to the summer would cause them to decrease.

Table 7 shows, for nearly all the soils in the survey area, the range site; the species composition that occurs in the potential natural plant community; and the potential annual production of vegetation in favorable, average, and unfavorable years. Potential annual production is the amount of vegetation that can be expected to grow annually on well managed rangeland that supports the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaf, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, average, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure and rainfall.

Range management maintains the capacity of the rangeland to produce forage for livestock and game animals and to provide wildlife habitat, water, and watershed protection. The primary objective of good range management is to keep the rangeland in excellent or good condition. The main management concern is responding to important changes in the plant community of a range site.

Range condition is determined by comparing the present vegetation on a range site with the potential native plant community for the site. Four range condition classes are recognized. The range site is in excellent condition if 76 to 100 percent of the present vegetation is the same kind as the potential native vegetation; in good condition if the percentage is 51 to 75 percent; in fair condition if the percentage is 26 to 50 percent; and in poor condition if the percentage is 25 or less. The potential production depends on the range site, the range condition, and the moisture available to plants during the growing season.

Measures that maintain or improve the range condition are needed on all of the rangeland in the county. These measure include proper stocking rates and rotation or deferred rotation grazing systems. These systems provide rest periods that maintain or improve the vigor of the key plants. Good range management also includes range seeding, fencing, and measures that provide water for livestock.

The soils in the county are assigned to 16 different range sites. The names of these sites are Clayey, Clayey Overflow, Claypan, Closed Depression, Dense Clay, Loamy Overflow, Saline Lowland, Sandy, Shallow Clay, Shallow To Gravel, Silty, Subirrigated, Thin Claypan, Thin Upland, Very Shallow, and Wet Meadow. The paragraphs that follow describe these range sites.

Clayey range site. The soils assigned to this range site have a clayey, somewhat restrictive horizon at a depth of less than 14 inches. The clayey subsoil releases moisture slowly to plants and somewhat restricts the development of plant roots.

The potential native vegetation is a prairie of mid and short grasses interspersed with a variety of forbs. Green needlegrass and western wheatgrass, which are cool-season grasses, make up about 65 percent of the vegetation. Sideoats grama, little bluestem, and big bluestem, which are warm-season grasses, make up about 20 percent of the vegetation, and blue grama and buffalograss, which are also warm-season grasses, make up 10 percent. Forbs such as heath aster, prairie coneflower, yarrow, sageworts, false boneset, and scarlet globemallow make up the remainder of the vegetation.

The major management concern on this site is maintaining the amount of the most productive plants. Green needlegrass, sideoats grama, little bluestem, and big bluestem rapidly lose their productive capacity after continued overgrazing because livestock prefer these species. Western wheatgrass initially increases in amount after overuse. If overuse continues, however, it decreases in amount. Blue grama and buffalograss increase in amount as the taller grasses decrease. The result is a less productive short-grass community. The amount of the most productive grasses can be maintained by using the proper stocking rates and a rotation grazing or deferred grazing program that provides periodic rest periods during the growing season of the plants. Limited grazing during wet periods minimizes soil compaction.

Clayey Overflow range site. The soils assigned to this range site regularly benefit from more than normal soil moisture because of stream overflow or runoff from higher adjacent areas. The surface layer and subsoil of these soils are silty clay or clay.

The potential native vegetation on this site are mixed prairie grasses. Big bluestem, a tall warm-season grass,

makes up about 55 percent of the vegetation. Western wheatgrass and green needlegrass are the main cool-season mid grasses. They make up 20 percent of the vegetation. Other warm-season tall and mid grasses, such as switchgrass, indiangrass, little bluestem, and sideoats grama, make up 20 percent of the vegetation. Leadplant and sedges make up about 5 percent of the vegetation.

The major management concern on this site is maintaining the amount of the most productive plants. Big bluestem, switchgrass, green needlegrass, indiangrass, and little bluestem rapidly lose their productive capacity and decrease in amount after continued overgrazing because livestock prefer these plants. Western wheatgrass and sideoats grama initially increase in amount as the amount of the other grasses decreases. If overgrazing continues, Kentucky bluegrass, a short cool-season grass, becomes the dominant plant on the site. Lower forage production is the result. The amount of the most productive grasses can be increased or maintained by proper stocking rates and a timely deferment or rotation grazing program that provides periodic rest periods during the growing season of the desired plants. Limiting grazing during wet periods minimizes soil compaction.

Claypan range site. The soils assigned to this range site have a sodium-affected subsoil. Salt accumulations generally are evident in the lower part of the B horizon, below a depth of 16 inches.

The potential native vegetation is a prairie of mid and short grasses interspersed with some forbs. Cool-season grasses make up about 65 percent of the vegetation. They include western wheatgrass, which accounts for 45 percent of the vegetation; green needlegrass, 15 percent; and needleandthread, 5 percent. Blue grama, buffalograss, and sideoats grama, which are warm-season grasses, make up about 25 percent of the vegetation. Blue grama is the dominant warm-season grass. Sedges, which are grass-like plants, and forbs make up the remaining 10 percent of the vegetation.

The major management concern on this site is maintaining the amount of the most productive plants. Green needlegrass, western wheatgrass, needleandthread, and sideoats grama rapidly lose their productive capacity and decrease in amount after continued overgrazing because livestock prefer these plants. Blue grama and buffalograss increase in amount as the other grasses decrease. The result is less forage production. The most productive grasses can be maintained by using the proper stocking rates along with a rotation grazing or deferred grazing program that provides periodic rest periods during the growing season of the plants. Soil compaction is a potential problem during wet periods.

Closed Depression range site. The soils in this range site may be excessively wet or ponded for short periods during periods of high precipitation or may be droughty during abnormally dry periods.

The potential native vegetation is dominated by western wheatgrass, which makes up about 85 percent of the vegetation, and sedges, which make up about 10 percent. However, the plant community is not stable because of the alternating wetness and droughtiness. Because areas of this range site are on flat or concave bottoms of closed depressions, the soils are excessively wet or ponded during wet periods and droughty during abnormally dry periods.

The major management concern on this site is maintaining the amount of the most desirable plant community. Continued overgrazing reduces the production of western wheatgrass, and trampling by livestock aggravates the poor drainage characteristics of the site. If overgrazing continues, short grasses, such as saltgrass and Kentucky bluegrass, increase in amount as western wheatgrass decreases. The result is a less productive site. The amount of the most productive grasses can be maintained by using proper stocking rates and a timely deferment of grazing, particularly when the soil surface is saturated and the plants are subject to damage by trampling. Limiting grazing in these areas when the soils are wet will limit soil compaction.

Dense Clay range site. The soils assigned to this range site are shallow to very deep soils in uplands. They have a weak or nearly structureless surface layer of clay that is underlain at a depth of 14 inches or less by dense, weak-structured clay or altered shale.

The potential native vegetation is a prairie of mid grasses interspersed with forbs. Western wheatgrass and green needlegrass, two cool-season grasses, make up about 90 percent of the vegetation. Forbs, such as wild onion, make up about 10 percent of the vegetation. This site does not have an understory of short grasses.

The major management concern on this site is maintaining the productivity of the green needlegrass and western wheatgrass. After continued overgrazing, these two grasses thin out and are replaced by invaders. In severely overgrazed areas, the site becomes bare of vegetation and highly susceptible to erosion. The green needlegrass and western wheatgrass can be maintained by using the proper stocking rates and a timely deferment or rotation grazing program that provides periodic rest periods during the growing season of the grasses. Grazing these sites when the soils are wet increases soil compaction.

Loamy Overflow range site. The soils in this range site regularly benefit from more than normal soil moisture because of stream overflow or runoff from the higher

adjacent areas. Texture of the surface layer and subsoil ranges from sandy loam to silty clay.

The potential native vegetation is a mixed grass prairie. Big bluestem, a tall warm-season grass, makes up about 55 percent of the vegetation. Other warm-season tall and mid grasses, such as switchgrass, indiangrass, little bluestem, and sideoats grama, make up 25 percent of the vegetation. Green needlegrass and western wheatgrass, which are cool-season grasses, make up 15 percent and leadplant and sedges make up about 5 percent.

The major management concern on this site is maintaining the amount of the most productive plants. Big bluestem, switchgrass, green needlegrass, indiangrass, and little bluestem rapidly lose their productive capacity and decrease in amount after continued overgrazing because livestock prefer these plants. Western wheatgrass and sideoats grama initially increase in amount as these grasses decrease. If overgrazing continues, Kentucky bluegrass, a short cool-season grass, increases in amount and becomes the principal plant on the site. Lower forage production is the result. The amount of the most productive grasses can be increased or maintained by using proper stocking rates and a timely deferment or rotation grazing program that provides periodic rest periods during the growing season of the desired plants.

Saline Lowland range site. These soils are poorly drained and have a sufficient concentration of soluble salts to affect the kind and amount of vegetation. Soil textures vary from loam to clay. The soils in this site are too saline to grow big bluestem.

The potential native vegetation is made up of salt-tolerant plants. Prairie cordgrass, western wheatgrass, and Nuttall alkaligrass make up about 70 percent of the vegetation. Alkali sacaton and switchgrass make up about 10 percent of the vegetation. Inland saltgrass, sedges, and forbs make up about 20 percent of the vegetation.

The major management concern on this site is maintaining the amount of the most productive plants. After continuous overgrazing, the most preferred and productive grasses lose vigor and thin out. Inland saltgrass then increases and becomes the principal grass on the site. Because inland saltgrass is unpalatable to livestock and productivity is low, this site loses its capacity to produce quality forage for livestock grazing. The amount of the most productive grasses can be maintained by using proper stocking rates and a rotation grazing or deferred grazing program that provides periodic rest periods during the growing season of these plants.

Sandy range site. These soils are very deep, well drained soils that have a surface layer of sandy loam or very fine sandy loam and grade into sandy loam to sand in the subsoil.

The potential native vegetation is a prairie of mixed grasses. Little bluestem, sand bluestem, and prairie sandreed, which are warm-season grasses, make up about 60 percent of the vegetation. Needleandthread and western wheatgrass, which are cool-season grasses, make up about 20 percent of the vegetation. Sideoats grama and blue grama make up about 10 percent of the vegetation. The remainder consists of grasslike sedges and forbs, such as heath aster, scurfpea, and sagewort.

The major management concern on this site is maintaining the amount of the most productive grasses. Sand bluestem and little bluestem decrease in amount after continued overgrazing because livestock prefer these plants. Prairie sandreed, needleandthread, and sideoats grama initially increase in amount as these other grasses decrease. If overgrazing continues, these grasses thin out and are replaced by blue grama and Kentucky bluegrass. Lower forage production is the result. The amount of the most productive grasses can be increased or maintained by using proper stocking rates and a timely deferment or rotation grazing program that provides periodic rest periods during the growing season of these plants.

Shallow Clay range site. These soils are shallow. They have a surface layer of clay and are underlain at a depth of 10 to 20 inches by relatively impervious shale or mudstone.

The potential native vegetation is a mixed grass prairie. Warm-season grasses dominate the site. They include little bluestem, which makes up about 30 percent of the vegetation; big bluestem, 15 percent; and sideoats grama and blue grama, 10 percent. Cool-season grasses, such as green needlegrass, western wheatgrass, and grasslike sedges, make up about 35 percent of the vegetation. Forbs, such as heath aster, false boneset, blacksamson, dotted gayfeather and sageworts, and shrubs, such as leadplant and rose, make up about 10 percent.

The major management concern on the site is maintaining the amount of the most productive grasses. Little bluestem, big bluestem, and green needlegrass lose their productive capacity and decrease in amount after continued overgrazing because livestock prefer these plants. Western wheatgrass and sideoats grama initially increase in amount as the other grasses thin out. If overgrazing continues, short grasses, such as blue grama and grasslike sedges, increase in amount and dominate the site. The site than becomes subject to erosion, and the production of forage is reduced. The amount of the most productive grasses can be maintained by using proper

stocking rates and a timely deferment or rotation grazing program that provides periodic rest periods during the growing season of the desired plants.

Shallow to Gravel range site. These soils are underlain at a depth of 10 to 20 inches by sand or gravel. The low available water capacity results in these soils being somewhat droughty.

The potential native vegetation is a mid grass prairie. Cool-season grasses make up about 50 percent of the vegetation. They include needleandthread, which makes up about 40 percent of the vegetation, and western wheatgrass, which makes up about 10 percent. Warm-season grasses make up about 40 percent of the vegetation. They include little bluestem, plains muhly, sideoats grama, and prairie dropseed, which make up about 20 percent, and blue grama and hairy grama, which make up about 20 percent. The remainder of the vegetation is made up of sedges, forbs, and shrubs.

The major management concern on this site is maintaining the amount of the most productive grasses. Needleandthread, western wheatgrass, little bluestem, plains muhly, sideoats grama, and prairie dropseed rapidly decrease in amount as overgrazing continues. As these grasses decrease in amount, sedges, blue grama and hairy grama increase. If overgrazing continues, the soil surface becomes bare and the productivity of the site is greatly reduced. The amount of the most productive grasses can be maintained by using proper stocking rates and a rotation or deferred grazing program that provides periodic rest during the growing season of these plants.

Silty range site. These well drained and moderately well drained soils have a surface layer and subsoil of loam to silty clay loam. They have a low to high available water capacity and a favorable relationship between water and plants.

The potential native vegetation is a mixed grass prairie. Cool-season grasses make up about 55 percent of the vegetation. Green needlegrass and western wheatgrass are the major cool-season grasses, but needleandthread and porcupinegrass are present in smaller amounts. Warm-season grasses, such as little bluestem, big bluestem, prairie dropseed, sideoats grama, and blue grama, make up about 35 percent of the vegetation. Forbs such as sageworts, heath aster, false boneset, and shrubs, such as leadplant, rose, and western snowberry, make up the remainder of the vegetation.

The major management concern on this site is maintaining the amount of the most productive grasses. Bluestem, prairie dropseed, porcupinegrass, and green needlegrass decrease in amount after continued overgrazing because livestock prefer these plants. Western wheatgrass and needleandthread initially increase in amount. If overgrazing continues, short grasses, such as blue grama and Kentucky bluegrass, increase in amount and become the dominant plants. Lower forage production is the result. The amount of the most productive grasses can be increased or maintained by using proper stocking rates and a timely deferment or rotation grazing program that provides periodic rest periods during the growing season of the desired plants.

Subirrigated range site. These soils are characterized by a water table that is beneficial to plants. The water table is within a depth of 36 to 60 inches during most of the growing season, although it can reach the surface during the spring for very short periods.

The potential native vegetation is dominated by tall warm-season grasses. Big bluestem is the dominant grass, and it makes up about 60 percent of the vegetation. Switchgrass, indiangrass, and little bluestem are found in smaller amounts. They make up about 20 percent of the vegetation. Western wheatgrass, sedges, and bluegrass make up about 15 percent of the vegetation. Forbs, such as maximillian sunflower, snowy milkweed, and Missouri goldenrod, make up the remainder of the vegetation.

The major management concern on this site is maintaining the amount of the most productive tall grasses. Big bluestem, indiangrass, and switchgrass decrease in amount after continuous grazing. As this occurs, western wheatgrass, sedges, and Kentucky bluegrass increase in amount. If continuous overgrazing occurs, Kentucky bluegrass, inland saltgrass, annual grasses, and weeds occupy the site. Lower forage production is the result. The amount of the most productive tall grasses can be maintained by using proper stocking rates and a rotation or deferred grazing program that provides periodic rest periods during the growing season of these plants.

Thin Claypan range site. These soils have a surface layer of loam to clay which changes abruptly, at a depth of less than four inches, to a sodium-affected subsoil. The subsoil has salt accumulations that are generally evident in the lower part of the B horizon, which is very thin and usually does not extend below a depth of 16 inches.

The normal potential native vegetation is a mixture of mid and short grasses. Western wheatgrass is the dominant cool-season grass. It makes up about 45 percent of the vegetation. Short warm-season grasses, such as blue grama and buffalograss, make up about 40 percent of vegetation. Inland saltgrass and sedges make up about 10 percent of the vegetation, and forbs, such as sageworts, heath aster, and brome snakeweed, make up the remainder of the vegetation.

The major management concern on this site is

maintaining the amount of the western wheatgrass. After continued overgrazing, western wheatgrass thins out and is replaced by blue grama, buffalograss, prickly pear and saltgrass. If overgrazing continues, considerable amounts of bare ground become evident, especially during dry periods, and weeds become common during wet periods. The amount of western wheatgrass can be increased or maintained by using proper stocking rates and a timely deferment program that provides periodic rest periods during the growing season of the desired plants.

Thin Upland range site. These soils have a thin surface layer that developed in calcareous parent material. The thin surface layer, or A horizon, varies in texture from sandy loam to silty clay loam. The relatively unweathered parent material, or C horizon, is strongly calcareous, generally soft, and very friable.

The potential native vegetation is a mixed grass prairie. Warm-season grasses dominate the vegetation. They consist of little bluestem, which makes up about 40 percent of the vegetation; sideoats grama, big bluestem, and plains muhly, 20 percent; and blue grama, 10 percent. Cool-season grasses, such as green needlegrass, western wheatgrass, and needleandthread, make up about 20 percent of the vegetation. Forbs, such as pasqueflower and blacksamson, and woody plants, such as leadplant and rose, make up the remainder of the vegetation.

The major management concern on this site is maintaining the amount of the most productive grasses. Little bluestem, big bluestem, green needlegrass, and plains muhly lose their productive capacity and decrease in amount after continued overgrazing because livestock prefer these plants. Western wheatgrass, sideoats grama, and needleandthread initially increase in amount as the other grasses thin out. If overgrazing continues, short grasses, such as blue grama, increase in amount and dominate the site. Lower forage production is the result. The amount of the most productive grasses can be increased or maintained by using proper stocking rates and a timely deferment or rotation grazing program that provides periodic rest periods during the growing season of the desired plants.

Very Shallow range site. These soils are very shallow and have a surface layer of loam or gravelly loam. They are underlain at a depth of less than 10 inches by sand and gravel. They are moderately to rapidly permeable and have a low available water capacity, which results in droughtiness of the soils.

The potential native vegetation is made up of mid and short grasses. Needleandthread is the dominant mid grass. It makes up about 30 percent of the vegetation. Short grasses, such as blue grama and hairy grama, make up about 30 percent of the vegetation. Sedges, such as threadleaf sedges, are important plants on this site. They make up about 20 percent of the vegetation. Forbs, such as dotted gayfeather, blacksamson, and sageworts, and shrubs, such as leadplant and yucca, make up the remainder of the vegetation.

The main management concern on this site is maintaining a good stand of grass. After overgrazing, this site rapidly deteriorates to a stand consisting of grama grasses, threadleaf sedge, and a few unpalatable forbs. If overgrazing continues, the stand of short grasses thins out, and much of the soil surface becomes bare and is exposed to erosion. A productive grass cover can be maintained on this site by using proper stocking rates and a timely deferment or rotation grazing program that provides periodic rest periods during the growing season of the desired plants.

Wet Meadow range site. These soils are characterized by ponding for a period of about 4 to 8 weeks following snowmelt or heavy rains. They formed in alluvial sediments and have a high content of organic matter.

The potential native vegetation on this site is a good stand of sedges and mid or tall grasses. Sedges, such as woolly sedges, makes up about 50 percent of the vegetation. Reedgrasses, prairie cordgrass, and fowl bluegrass make up about 40 percent of the vegetation. Understory species, such as western wheatgrass and spikesedge, and rushes and forbs, such as smartweed, aster, and milkweed make up the remaining 10 percent of the vegetation.

The major management concern on this site is maintaining the amount of the most productive plants. After continued overgrazing, the tall grasses and more palatable sedges decrease in amount; the less palatable sedges, spikesedge, and rushes increase in amount; and weedy grasses, such as foxtail barley, invade the site. The less palatable vegetation results in a reduction of usable forage. The amount of the most productive plants can be maintained by using proper stocking rates and a grazing program that involves a timely grazing deferment program to provide rest periods during the growing season of these plants.

Native Woodland, Windbreaks, and Environmental Plantings

Thomas A. Hurford, forester, Natural Resources Conservation Service, helped prepare this section.

In Hyde County, native trees and shrubs generally grow in the deeper drainageways on breaks along Lake Sharpe and along flood plains of major drainageways. The soils in areas where trees and shrubs grow are not classified as woodland soils. Nearly all of the wooded areas provide habitat for wildlife and protection for domestic animals.

Scattered, individual plants or clumps of green ash, bur oak, hackberry, juniper, American plum, common chokecherry, skunkbush sumac, western snowberry, or wild rose are common in areas of Opal and Sansarc soils on north- and east-facing slopes in draws. Some of the deep draws on breaks have a dense stand of eastern redcedar on north- and east-facing slopes. Cottonwood, peachleaf willow, American elm, and boxelder commonly grow on the flood plains of major drainageways.

The early settlers valued the woody vegetation as a source of fuel and food. Currently, native trees and shrubs are used mainly for wildlife habitat.

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and are spaced at specific intervals across the field. The interval depends on the erodibility of the soils in the field. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To maximize plant survival, a healthy planting stock of suitable species should be properly planted on a well prepared site and maintained in good condition.

Grazing is extremely damaging to windbreaks and environmental plantings because livestock compact the soil and remove the lower branches of trees and shrubs. Removal of the lower branches reduces the effectiveness of the windbreaks.

Grasses and weeds prevent the maximum growth of windbreaks. Clean cultivation and applications of herbicide help to control weeds (fig. 13). Fallowing the year before planting helps to provide a reserve supply of moisture, which is necessary for the establishment of seedlings.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on the various soil types in the county. The estimates in the table are based on measurements and observations of established plantings that have received adequate care. They can be used as a guide in planning windbreaks.

At the end of each description under the heading "Detailed Soil Map Units," and in the section "Interpretive Groups," which follows the tables in the back of the survey, the soils are assigned to windbreak suitability groups. A windbreak suitability group is a distinctive group of soils that supports trees and shrubs having similar growth and survival rates if weather cond tions are normal and the windbreak is properly managed. The relationship between the soils and the growth of trees and shrubs was ascertained during this survey. Soil properties that affect the supply of moisture and plant nutrients have the greatest influence on the growth of trees and shrubs. Soil reaction, the content of salts, and the seasonal high water table also are important.

Group 1. These soils are well suited to woody plantings. They are on flood plains and till plains. They receive additional moisture because of runoff and flooding. Some areas are subirrigated. All climatically suited trees and shrubs grow well.

This group consists mainly of loamy, silty, and clayey, somewhat poorly drained to well drained, very deep soils. Available water capacity is moderate or high. The soils that have a surface layer of fine sandy loam or loamy fine sand are subject to severe wind erosion. Bon, Onita, and Prosper soils are in this group.

Group 2. These soils are well suited to woody plantings. They are on flood plains. They receive additional moisture from runoff or have a high water table within the root zone. All climatically suited trees and shrubs grow well.

This group consists of very deep, silty, loamy, and clayey, poorly drained and somewhat poorly drained soils. Available water capacity is high. The soils that have a surface layer of sandy loam or loamy fine sand are subject to severe wind erosion. Lawet soils are in this group.

Group 3. These soils are well suited to woody plantings. They are on lake plains, till plains, and moraines. Except for those trees and shrubs that require an abundant moisture supply to grow well, all climatically suited trees and shrubs grow well.

This group consists of very deep, loamy and silty, well drained soils. Available water capacity is moderate or high. The susceptibility to water erosion ranges from slight on nearly level soils to severe on strongly sloping soils. The susceptibility to wind erosion ranges from slight to severe. Bend, Eakin, Glenham, Highmore, and Ree soils are in this group.

Group 4. These soils are fairly well suited to woody plantings. They are on flood plains, till plains, moraines, plains, and dissected plains. Most of the climatically suited trees and shrubs grow well; however, maximum growth is not possible because of the limited root development.

This group consists of moderately deep to very deep, clayey soils and clayey soils that have a loamy or silty surface layer. They are moderately well drained and well drained. Available water capacity is low or moderate in the more clayey soils and moderate or high in the silty or loamy soils. Soils having accumulations of salts in the lower part of the subsoil also are in this group. The clayey soils are subject to severe wind erosion. The moderately sloping and strongly sloping soils are subject to severe

Figure 13.—A clean cultivated field windbreak in an area of Glenham-Prosper loams, 2 to 6 percent slopes.

water erosion. Oko, Opal, Peno, Promise, Raber, Stickney, Walke, and Wendte soils are in this group.

Group 5. These soils are well suited to woody plantings. They are on terraces. All climatically suited trees and shrubs grow well, except those that require an abundant moisture supply.

This group consists mainly of very deep, loamy and sandy, well drained and somewhat excessively drained soils. Available water capacity generally is low or moderate. These soils are subject to severe or very severe wind erosion. Blendon and Henkin soils are in this group.

Group 6. These soils are poorly suited to woody plantings. They are on outwash plains. No trees and shrubs grow well. Trees and shrubs can be established, but optimum survival and growth should not be expected. Field windbreaks are not effective because of a slow growth rate and a low height at maturity.

This group consists of silty and loamy, well drained and somewhat excessively drained soils. They are moderately deep over bedrock or are shallow or moderately deep over sand and gravel. Available water capacity is low or moderate. The moderately sloping and strongly sloping soils are subject to severe erosion. Delmont and Oahe soils are in this group.

Group 7. These soils are poorly suited to woody plantings. No trees or shrubs grow well. Coniferous trees and shrubs grow better than deciduous trees and shrubs. It is possible to establish plantings, but optimum survival

and growth should not be expected. Field windbreaks are not effective because of a slow growth rate and a low height at maturity.

This group consists of very deep to moderately deep, sandy, somewhat excessively drained and excessively drained soils. Available water capacity is very low or low. These soils are subject to very severe wind erosion. None of the soils in the survey are in this group.

Group 8. These soils are poorly suited to woody plantings. They are lake plains, till plains, and moraines. No trees and shrubs grow well. It is possible to establish plantings but optimum survival and growth should not be expected. Field windbreaks are not effective because of a slow growth rate and a low height at maturity.

This group consists of very deep to moderately deep, loamy and silty, well drained soils that contain enough calcium carbonate at or near the surface for the growth and survival of trees and shrubs to be impaired. Available water capacity is moderate or high. These soils are subject to severe wind and water erosion. Edwin and Java soils are in this group.

Group 9. These soils are poorly suited to woody plantings. They have a dense claypan subsoil and an excessive amount of salts in the lower part of the subsoil. They are on plains and till plains. No trees and shrubs grow well because of the dense, claypan subsoil and the salts.

This group consists of very deep, silty and loamy, moderately well drained soils. Available water capacity is low or moderate. Carter, Cavo, and DeGrey soils are in this group.

Group 10. These soils generally are unsuited to woody plantings. The soils are shallow over bedrock, very shallow over gravel, very saline, very alkaline, stony, or very wet. However, some special plantings for wildlife, recreation, or beautification may be planted in some areas. The most favorable sites should be selected, and only those trees and shrubs that have the best potential to survive and grow should be planted.

The soils in this group have a wide range of texture, depth, drainage, available water capacity, permeability, and slope. The susceptibility to water erosion and wind erosion ranges from slight to very severe. Betts, Bullcreek, Capa, Durrstein, Egas, Hoven, Hurley, Jerauld, Kolls, Macken, Sansarc, and Talmo soils are in this group.

Additional information about planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local offices of the Natural Resources Conservation Service or the South Dakota Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The

surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

Connie M. Vicuna, biologist, Natural Resources Conservation Service, helped prepared this section.

Hyde County provides a variety of wildlife habitats, including rangeland, cropland, and wetland. Wildlife species found in the county include waterfowl, pheasants, gray partridge, doves, white-tail deer, mule deer, cottontail rabbits, jack rabbits, and squirrels. Important furbearers include fox, coyotes, raccoons, and skunks. Prairie chickens and sharptail grouse also are in Hyde County. Fish are important in Lake Sharpe. Other fishing opportunities are associated with stock dams. Medicine Creek and Chapelle Creek are major drainageways, but they flow intermittently and do not support significant fisheries.

Wetlands occur throughout Hyde County. They range in size from less than 0.1 acre to more than 1000 acres. The water regimes are equally variable, and they include temporary to semi-permanent areas of water. The natural variability in water depth is further magnified by the variability of climatic conditions from year to year. During normal or wet years, the variety and number of wetlands in this area attract waterfowl from spring through fall. Durrstein, Egas, Hoven, Kolls, Lawet, Macken, Plankinton, and Tetonka soils are important wetland soils.

Habitat for rangeland wildlife is found throughout the county. The grasslands, in conjunction with the intermixed areas of wetlands, provide habitat that makes this area important nationwide for waterfowl production. Rangeland also provides habitat for sharp-tail grouse, prairie chickens, and deer and other mammals.

Habitat for woodland wildlife in the county is sparse. It occurs as scattered clumps of woodland in draws and on flood plains along drainageways, especially where grazing by livestock has not been heavy. While shrubby and wooded areas are not abundant, they are critical for many wildlife species, either for food or as cover during some part of the year. Management that protects and improves these wooded sites is necessary. It is particularly effective if combined with proper management of the surrounding grasslands. Woody habitats are important for migrating songbirds, as well as for deer, sharp-tail grouse, bobcat, and magpie.

Soils affect the kind and amount of vegetation and water available to wildlife for food and cover. Therefore, they also affect the distribution and abundance of wildlife. The abundance of wildlife in part depends on the amount and distribution of food, cover, and water. An understanding of soil capabilities is helpful in the development of wildlife habitat. This development includes planting desirable vegetation, maintaining the existing vegetation, and promoting natural establishment of desirable plants.

Soil associations, which are described under the heading "General Soil Map Units," provide some indication of the actual or potential distribution and density of wildlife species and wildlife habitats. A soil association represents a relatively uniform topographic unit with a distinct set of capabilities for producing and maintaining vegetation. Land use patterns and management practices are also more uniform within a soil association. The Java-Glenham, Glenham-Prosper-Java, and Java-Stickney-Hoven associations contain the largest number and variety of wetlands, and they offer the greatest potential for the development of waterfowl habitat. The Opal-Promise and Sansarc-Opal associations are in steep rangeland areas, and they have excellent potential as habitat for sharptail grouse and deer.

Individual soils have different potentials for the development and maintenance of wildlife habitat elements. They affect the degree or extent to which habitat can be established or improved. In table 10, the soils in Hyde County are rated according to their potential for providing specific elements of wildlife habitat. This information can be used in planning parks, wildlife areas, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each habitat. The ratings, described in the following paragraphs, indicate the ease of establishing or maintaining these elements of wildlife habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element. The element can be established, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element are very severe and that unsatisfactory

results can be expected. Establishing, improving, or maintaining the element is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are crested wheatgrass, intermediate wheatgrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, wheatgrass, and grama grasses.

Planted woody plants include trees and shrubs that produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are the depth of the root zone, available water capacity, and wetness. Examples of these plants are bur oak, cottonwood, chokecherry, green ash, plum, hawthorn, and dogwood. Examples of fruit-producing shrubs suitable for planting on soils rated *good* are American plum, Russian-olive, autumn-olive, and Siberian crabapple.

Native deciduous trees produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of native deciduous trees are the thickness of the root zone, available water capacity, and wetness. Examples of these trees are ash, chokecherry, cottonwood, and bur oak.

Native coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Native shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of native shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of these shrubs are buffaloberry, plum, snowberry, and sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, cordgrass, rushes, sedges, saltgrass, and reeds.

Shallow water areas have an average water depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

Information concerning the habitat elements needed to maintain a specific wildlife species can be obtained from the local office of the Natural Resources Conservation Service or from the South Dakota Department of Game, Fish, and Parks.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soil or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed

performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding or ponding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, ponding, and shrinking and swelling can cause the movement of footings. A high water table, depth to bedrock, large stones, slope, ponding, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, ponding, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be

expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, ponding, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, ponding, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity by microorganisms. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, ponding, and flooding affect both types of landfill. Texture, stones and boulders, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are

assumed. Each soil is evaluated to a depth of about 5 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, reaction, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, salinity, aeration, permeability, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special

design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by the cropping system, depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, or restricted permeability adversely affect maintenance.

Grassed waterways are established or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the establishment, growth, and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

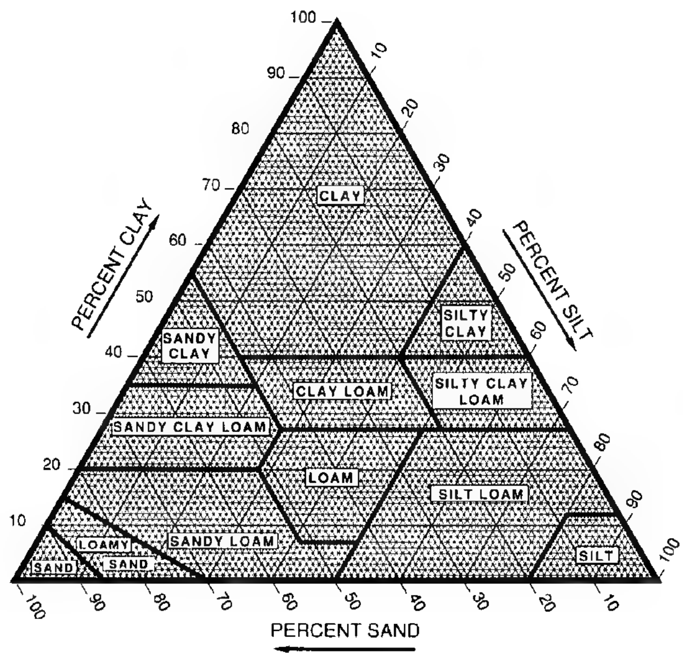

Figure 14.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 14). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil

that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 15.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $1/3$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior. It is also considered in the design and management of irrigation systems and the development of nutrient and pesticide management plans.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown, in the selection of a tillage system, in residue management decisions, and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in selecting pesticides, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at

saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on the basis of measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.20 to 0.37. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of potential soil loss. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by limiting residue removal operations, by including high-residue crops in the crop rotation a high percentage of the time, and by applying livestock manure to the soil. When manure is applied to the land, it should be done in an environmentally acceptable manner. Organic matter affects the available water capacity, infiltration rate, pesticide efficiency and persistence, and tilth. It is a source of nitrogen and other essential nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff

potential) when thoroughly wet. These consist mainly of very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 17, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *extremely brief* if less than 4 hours, *very brief* if 4 to 48 hours, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; March-October, for example, means that flooding can occur during the period March through October.

The information about flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and the absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion

of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(11)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (*Ust*, meaning intermittent dryness, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplustolls (*Hapl*, meaning minimal horizonation, plus *ustoll*, the suborder of the Mollisols that has an ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group and do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Haplustolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(10)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(11)*. Unless otherwise stated, colors in the descriptions are for dry soil, although mottles are described under moist conditions. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Bend Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Lake plains
Parent material: Silty glaciolacustrine sediments
Slope: 0 to 4 percent

Typical Pedon

Bend loam, in an area of Bend-Edwin complex, 0 to 4 percent slopes (fig. 15), 1,240 feet south and 1,450 feet

east of the northwest corner of section 17, T. 114 N., R. 71 W.

Ap—0 to 8 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; neutral; abrupt smooth boundary.

Bw—8 to 13 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots; neutral; clear wavy boundary.

Bk—13 to 38 inches; light yellowish brown (2.5Y 6/3) loam, light olive brown (2.5Y 5/3); weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; very hard, friable, slightly sticky and slightly plastic; few fine roots; common fine accumulations of carbonate; violent effervescence; moderately alkaline; clear smooth boundary.

C—38 to 46 inches; light yellowish brown (2.5Y 6/3) silt loam that is varved with very thin layers of very fine sand to clay, light olive brown (2.5Y 5/3) moist; many medium and coarse distinct light gray (10YR 7/1) relic mottles; massive; hard, friable, slightly sticky and slightly plastic; varves 1 to 2 millimeters thick; common medium prominent brownish yellow (10YR 6/6) iron stains; common fine cylindrical iron concretions; strong effervescence; moderately alkaline; clear smooth boundary.

Cyz—46 to 60 inches; light yellowish brown (2.5Y 6/3) silt loam that is varved with very thin layers of very fine sand to clay, light olive brown (2.5Y 5/3) moist; many medium and coarse distinct light gray (10YR 7/1) relic mottles; massive; hard, friable, slightly sticky and slightly plastic; varves 1 to 2 millimeters thick; common medium prominent brownish yellow (10YR 6/6) iron stains; common fine cylindrical iron concretions; common fine and medium platelike nests of gypsum; few fine cylindrical salt masses; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 11 to 26 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 40 inches

A horizon:
Hue—10YR; value—3 or 4 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly silt loam but loam in some pedons

Bw horizon:
Hue—10YR or 2.5Y; value—4 to 6 (3 to 5 moist); and chroma—2 to 4
Texture—silt loam, loam, clay loam, or silty clay loam

Bk horizon:
Hue—10YR or 2.5Y; value—6 to 8 (4 to 6 moist); and chroma—2 to 4
Texture—silt loam or loam

C horizon:
Hue—2.5Y; value—5 to 8 (4 to 6 moist); and chroma—2 to 4
Texture—silt loam or loam that has very thin varves of very fine sand to clay

Cyz horizon:
Hue—2.5Y; value—6 to 8 (4 to 6 moist); and chroma—2 to 4
Texture—silt loam that has very thin varves of very fine sand to clay

Betts Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Moraines
Parent material: Loamy glacial till
Slope: 6 to 40 percent

Typical Pedon

Betts loam, in an area of Java-Betts loams, 6 to 15 percent slopes, 1,900 feet south and 2,250 feet east of the northwest corner of sec. 29, T. 116 N., R. 71W.

A—0 to 2 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, very friable; about 2 percent fine pebbles; slight effervescence; neutral; abrupt wavy boundary.

Bk1—2 to 10 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, sticky and plastic; many fine accumulations of carbonate; about 2 percent fine pebbles; violent effervescence; slightly alkaline; clear smooth boundary.

Bk2—10 to 18 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; weak fine and medium subangular blocky structure; very hard, firm, sticky and plastic; common fine and medium

accumulations of carbonate; about 2 percent fine pebbles; strong effervescence; slightly alkaline; gradual wavy boundary.

BC—18 to 50 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; few fine concretions of carbonate; about 5 percent fine pebbles; strong effervescence; slightly alkaline; gradual wavy boundary.

Cyz—50 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; common fine and medium accumulations of gypsum and other salts; about 2 percent pebbles; strong effervescence; slightly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 3 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 40 inches

A horizon:
Hue—10YR; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly loam but clay loam in some pedons

Bk horizon:
Hue—10YR to 5YR; value—5 or 7 (4 or 6 moist); and chroma—2 or 4
Texture—clay loam or loam

C horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam or loam

Some pedons have a Bw horizon, and some pedons do not have a BC horizon.

Blendon Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Outwash plains
Parent material: Loamy glacial meltwater deposits
Slope: 0 to 2 percent

Typical Pedon

Blendon loam, in an area of Henkin-Blendon fine sandy loams, 0 to 4 percent slopes, 1,500 feet south and 400 feet east of the northwest corner of sec. 5, T. 114 N., R. 71 W.

Ap—0 to 7 inches; dark gray (10YR 4/1) fine sandy loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.

A—7 to 16 inches; dark gray (10YR 4/1) fine sandy loam, very dark gray (10YR 3/1) moist; weak coarse prismatic structure parting to moderate fine granular; slightly hard, very friable; neutral; clear smooth boundary.

Bw1—16 to 23 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable; neutral, clear smooth boundary.

Bw2—23 to 40 inches; grayish brown (2.5Y 5/2) sandy loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; hard, very friable; neutral; clear smooth boundary.

Bk—40 to 48 inches; light brownish gray (2.5Y 6/2) loamy sand, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; slightly hard, very friable; many fine accumulations of carbonate; strong effervescence; moderately alkaline; clear smooth boundary.

C—48 to 60 inches; light yellowish brown (2.5Y 6/4) loamy sand, light olive brown (2.5Y 5/4) moist; single grain; loose; common fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 50 inches
Depth to carbonates: 40 to 60 inches or more
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR; value—3 or 4 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly fine sandy loam but sandy loam or loam in some pedons

Bw horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 or 3 moist); and chroma—1 to 3
Texture—dominantly sandy loam but fine sandy loam or loam in some pedons

Bk horizon:
Hue—10YR or 2.5Y; value—4 to 7 (3 to 5 moist); and chroma—2 or 3
Texture—dominantly loamy sand or fine sandy loam but loamy fine sand or sandy loam in some pedons

C horizon:
Hue—10YR or 2.5Y; value—5 to 7 (3 to 6 moist); and chroma—2 to 4
Texture—dominantly loamy sand or loamy fine sand but sandy loam or fine sandy loam in some pedons

Bon Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Loamy alluvium
Slope: 0 to 1 percent

Typical Pedon

Bon loam, channeled, 2,600 feet north and 41 feet east of the southwest corner of sec. 29, T. 111 N., R. 73 W.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak very fine and fine granular structure; soft, very friable; slight effervescence; slightly alkaline; clear smooth boundary.
A2—4 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure parting to weak very fine subangular blocky; slightly hard, very friable; slight effervescence; slightly alkaline; clear smooth boundary.
Bw1—8 to 12 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, very friable; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear smooth boundary.
Bw2—12 to 18 inches; very dark gray (10YR 3/1) silt loam, black (10YR 2/1) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable; slight effervescence; moderately alkaline; clear smooth boundary.
Bw3—18 to 27 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak coarse and medium prismatic structure parting to weak coarse and medium subangular blocky; soft, very friable; few fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual smooth boundary.
Bk1—27 to 36 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak coarse and medium subangular blocky structure; soft, very friable; common fine accumulations of carbonate; violent effervescence; moderately alkaline; gradual smooth boundary.
Bk2—36 to 45 inches; dark grayish brown (2.5Y 4/2) loam, very dark grayish brown (2.5Y 3/2) moist; weak coarse subangular blocky structure; soft, very friable; many fine accumulations of carbonate; violent effervescence; moderately alkaline; clear smooth boundary.
C—45 to 60 inches; dark gray (5Y 4/1) loam that is stratified with thin lenses of clay loam and sandy loam, very dark gray (5Y 3/1) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine accumulations of carbonate; violent effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 or more inches
Depth to carbonates: 0 to 20 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—loam

Bw horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 or 3 moist); and chroma—1 to 3
Texture—loam or silt loam

Bk horizon:
Hue—10YR or 2.5Y; value—3 to 7 (2 to 5 moist); and chroma—1 to 3
Texture—dominantly loam but silt loam or fine sandy loam in some pedons

C horizon:
Hue—10YR to 5Y; value—3 to 7 (2 to 5 moist); and chroma—1 to 3
Texture—loam that has strata of loamy fine sand to clay loam

Bullcreek Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Very slow
Landform: Fans
Parent material: Clayey alluvium
Slope: 0 to 6 percent

Typical Pedon

Bullcreek clay, 0 to 6 percent slopes (fig. 16), 1,500 feet east and 1,250 feet south of the northwest corner of sec. 23, T. 109 N., R. 73 W.

A—0 to 2 inches; dark gray (10YR 4/1) clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to weak fine subangular blocky; very hard, firm, sticky and plastic; many fine and very fine roots; cracks 1/2 inch wide; strong effervescence; moderately alkaline; clear smooth boundary.

Bss—2 to 8 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; weak coarse and medium subangular blocky structure parting to weak fine subangular blocky; very hard, firm, very sticky and very plastic; common very fine roots; cracks 1/2 inch wide; very few intersecting slickensides; strong effervescence; moderately alkaline; gradual wavy boundary.

Bssyz—8 to 13 inches; dark grayish brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; weak coarse subangular blocky structure parting to weak fine subangular blocky; very hard, firm, very sticky and very plastic; few very fine roots; cracks 1/4 inch wide; few intersecting slickensides; many very fine nests of gypsum and other salts; strong effervescence; moderately alkaline; gradual smooth boundary.

Byz—13 to 23 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine nests of gypsum and other salts; strong effervescence; moderately alkaline; gradual smooth boundary.

Cyz1—23 to 46 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, very sticky and very plastic; few fine iron and manganese concretions; common very fine nests of gypsum and other salts; strong effervescence; slightly alkaline; gradual wavy boundary.

Cyz2—46 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, very sticky and very plastic; few fine iron and manganese concretions; many very fine nests of gypsum and other salts; strong effervescence; slightly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 20 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 6 to 20 inches

A horizon:
Hue—10YR to 5Y; value—4 or 5 (2 or 3 moist); and chroma—1 to 3
Texture—dominantly clay but silty clay in some pedons

Bss horizon:
Hue—10YR to 5Y; value—4 to 6 (3 or 4 moist); and chroma—2 or 3
Texture—clay

C horizon:
Hue—10YR to 5Y; value—5 or 6 (4 or 5 moist); and chroma—1 to 4
Texture—clay

Capa Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landform: Plains
Parent material: Clayey sediments weathered from shale
Slope: 0 to 4 percent

Typical Pedon

Capa silt loam, in an area of Capa-Carter silt loams, 0 to 4 percent slopes, 520 feet north and 2,000 feet west of the southeast corner of sec. 31, T. 109 N., R. 72 W.

E—0 to 2 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak very thin platy structure; slightly hard, friable; neutral; abrupt smooth boundary.

Btn—2 to 8 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium columnar structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few shiny films on faces of peds; slightly alkaline; gradual smooth boundary.

Btnyz—8 to 15 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few shiny films on faces of peds; few fine nests of gypsum and other salts; slight effervescence; moderately alkaline; clear smooth boundary.

Bkyz—15 to 22 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium and fine prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few fine accumulations of carbonate; few fine nests of gypsum and other salts; slight effervescence; moderately alkaline; clear smooth boundary.

Cz—22 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; slight effervescence; common fine shale fragments; few fine and medium nests of salts; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 16 inches
Depth to carbonates: 4 to 12 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 6 to 16 inches

E horizon:
Hue—10YR or 2.5Y; value—5 or 6 (3 to 5 moist); and chroma—1 or 2
Texture—dominantly silt loam but loam in some pedons

Btn horizon:
Hue—10YR to 5Y; value—4 or 5 (2 to 4 moist); and chroma—1 or 2
Texture—clay

Btnyz and Bkz horizon:
Hue—10YR to 5Y; value—4 to 6 (3 to 5 moist); and chroma—1 or 2
Texture—clay or silty clay

Cz horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—1 or 2
Texture—clay or silty clay

Carter Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Very slow
Landform: Plains
Parent material: Clayey sediments weathered from shale
Slope: 0 to 4 percent

Typical Pedon

Carter silt loam, in an area of Carter-Promise complex, 0 to 3 percent slopes, 630 feet west and 2,560 feet north of the southeast corner of sec. 17, T. 109 N., R. 72 W.

A1—0 to 4 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, very friable; slightly acid; clear smooth boundary.

A2—4 to 6 inches; dark gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist; weak medium and fine subangular blocky structure parting to weak fine granular; slightly hard, very friable; cracks 1/2 to 1 inch wide; slightly acid; abrupt smooth boundary.

Btn1—6 to 9 inches; dark gray (10YR 4/1) clay, very dark grayish brown (10YR 3/2) moist; weak medium columnar structure parting to weak coarse and medium subangular blocky; very hard, firm, sticky and plastic; neutral; gradual smooth boundary.

Btn2—9 to 18 inches; dark gray (10YR 4/1) clay, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak coarse and medium subangular blocky; very hard, firm, sticky and plastic; few shiny films on faces of peds; cracks 1/2 to 1 inch wide; slightly alkaline; gradual smooth boundary.

Bk—18 to 24 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate coarse subangular blocky structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; cracks 1/2 to 1 inch wide; few fine and medium accumulations of carbonate; few fine nests of gypsum and other salts; strong effervescence; moderately alkaline; gradual smooth boundary.

Bkz—24 to 32 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; very hard, firm, sticky and plastic; common fine and medium accumulations of carbonate; common fine and medium nests of gypsum and other salts; strong effervescence; moderately alkaline; gradual smooth boundary.

Cz—32 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; common fine and medium accumulations of gypsum and other salts; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: 10 to 23 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 14 to 50 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly silt loam but silty clay loam in some pedons

Bt horizon:
Hue—10YR or 2.5Y; value—4 or 5 (2 to 4 moist); and chroma—1 or 2
Texture—clay

Bk horizon:
Hue—10YR or 2.5Y; value—5 or 6 (3 to 5 moist); and chroma—2 or 3
Texture—clay or silty clay

C horizon:
Hue—2.5Y or 5Y; value—4 to 6 (3 to 5 moist); and chroma—1 or 2
Texture—clay or silty clay

Cavo Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 6 percent

Typical Pedon

Cavo loam, in an area of Glenham-Java-Cavo loams, 0 to 4 percent slopes, 430 feet north and 290 feet east of the southwest corner of sec. 20, T. 113 N., R. 71 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak medium and fine granular; soft, friable; slightly acid; clear smooth boundary.

E—5 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; soft, friable; about 2 percent fine pebbles; slightly acid; abrupt smooth boundary.

Btn1—7 to 11 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium columnar structure parting to moderate medium blocky; very hard, very firm, sticky and plastic; few shiny films on faces of peds; thin continuous grayish brown (10YR 5/2) coatings on tops of columns; about 2 percent fine pebbles; slightly alkaline; gradual wavy boundary.

Btn2—11 to 18 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium blocky; very hard, very firm, sticky and plastic; common shiny films on faces of peds; about 2 percent fine pebbles; slightly alkaline; clear smooth boundary.

Bkyz—18 to 29 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; many fine and medium accumulations of carbonate; many fine and medium nests of gypsum and other salts; about 2 percent fine pebbles; strong effervescence; moderately alkaline; gradual smooth boundary.

Cyz1—29 to 39 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct yellowish brown (10YR 5/6) iron masses; massive; hard, firm, slightly sticky and slightly plastic; common fine accumulations of carbonate; common fine and medium nests of gypsum and other salts; about 2 percent fine pebbles and shale fragments; strong effervescence; moderately alkaline; gradual wavy boundary.

Cyz2—39 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; few fine distinct yellowish brown (10YR 5/4) iron masses; massive; hard, firm, slightly sticky and slightly plastic; common fine accumulations of carbonate; common fine nests of gypsum and other salts; about 2 percent fine pebbles and shale fragments; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 12 to 20 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 13 to 26 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly loam but silt loam in some pedons

E horizon:
Hue—10YR; value—5 to 7 (3 or 4 moist); and chroma—1 or 2
Texture—loam or silt loam

Btn horizon:
Hue—10YR or 2.5Y; value—4 or 5 (3 or 4 moist); and chroma—1 or 2
Texture—clay loam or clay

Bkyz horizon:
Hue—10YR to 5Y; value—5 or 6 (4 or 5 moist); and chroma—1 or 2
Texture—clay loam or clay

Cyz horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam or clay

DeGrey Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landform: Till plains
Parent material: Silty mantle over loamy glacial till
Slope: 0 to 6 percent

Typical Pedon

A—0 to 5 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak medium and fine

granular structure; soft, friable; slightly acid; clear smooth boundary.

E—5 to 8 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak very thin and thin platy structure; soft, friable; slightly acid; abrupt smooth boundary.

Btn1—8 to 13 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium columnar structure parting to strong medium and coarse blocky; very hard, very firm, sticky and plastic; common shiny films on faces of peds; thin continuous gray (10YR 5/1) coatings on tops of columns; neutral; clear smooth boundary.

Btn2—13 to 18 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to strong medium and coarse blocky; very hard, very firm, sticky and plastic; common shiny films on faces of peds; many patchy organic coatings, very dark grayish brown (10YR 3/2) moist; moderately alkaline; clear wavy boundary.

Bk—18 to 29 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium and coarse blocky; very hard, very firm, sticky and plastic; few fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

Bkz—29 to 39 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium and coarse blocky; hard, firm, sticky and plastic; common fine and medium accumulations of carbonate; few fine accumulations of gypsum and other salts; violent effervescence; moderately alkaline; gradual wavy boundary.

2Cyz—39 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky, plastic; common fine distinct gray (N 6/0) iron depletions; few fine accumulations of carbonate; few fine and medium accumulations of gypsum and other salts; about 2 percent fine pebbles; strong effervescence; strongly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 10 to 24 inches
Depth to contrasting parent material: 20 to 40 inches over glacial till
Depth to gypsum and other visible salts: 16 to 45 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—silt loam

E horizon:
Hue—10YR; value—5 to 7 (3 or 4 moist); and chroma—1 to 3
Texture—silt loam

Btn horizon:
Hue—10YR or 2.5Y; value—4 or 5 (3 or 4 moist); and chroma—1 or 2
Texture—silty clay or silty clay loam

Bk horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 or 5 moist); and chroma—2 to 4
Texture—silty clay or silty clay loam

2C horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam or loam

Delmont Series

Depth to bedrock: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderate in the subsoil and very rapid in the underlying layer
Landform: Outwash plains and moraines
Parent material: Loamy alluvium or outwash sediments overlying sand and gravel
Slope: 0 to 15 percent

Typical Pedon

Delmont loam, in an area of Oahe-Delmont loams, 0 to 2 percent slopes, 570 feet south and 90 feet west of the northeast corner of sec. 3, T. 115 N., R. 73 W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable; about 2 percent fine pebbles; neutral; abrupt smooth boundary.

Bw—5 to 14 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, friable; about 2 percent fine pebbles; neutral; clear smooth boundary.

Bk—14 to 17 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; soft, friable; few fine accumulations of carbonate; about 5 percent gravel; strong effervescence; slightly alkaline; clear smooth boundary.

2C1—17 to 25 inches; olive gray (5Y 5/2) very gravelly loamy sand, olive gray (5Y 4/2) moist; single grain; loose; calcium carbonate on the undersides of gravel; about 50 percent gravel, by volume; violent

effervescence; moderately alkaline; clear smooth boundary.

2C2—25 to 60 inches; brown (10YR 5/3) very gravelly sand, brown (10YR 4/3) moist; single grain; loose; about 60 percent gravel, by volume; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: 14 to 20 inches
Depth to contrasting parent material: 14 to 20 inches over sand and gravel
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR; value—3 or 4 (2 or 3 moist); and chroma—1 to 3
Texture—loam

Bw horizon:
Hue—10YR; value—3 to 5 (2 or 3 moist); and chroma—1 to 3
Texture—loam or sandy loam

Bk horizon:
Hue—10YR; value—3 to 5 (2 or 3 moist); and chroma—1 to 3
Texture—sandy loam or loam

2C horizon:
Hue—5YR to 5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—very gravelly loamy sand, gravelly sand, very gravelly sand, or gravelly loamy sand

Durrstein Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Flood plains
Parent material: Clayey alluvium
Slope: 0 to 1 percent

Typical Pedon

Durrstein loam, in an area of Durrstein-Egas complex, 2,220 feet north and 350 feet west of the southeast corner of sec. 30, T. 116 N., R. 72 W.

A—0 to 2 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.

E—2 to 6 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak coarse subangular blocky structure parting to moderate medium and thin platy; slightly hard, friable; neutral; abrupt smooth boundary.

Btn—6 to 11 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium columnar structure parting to moderate medium and coarse subangular blocky; very hard, very firm, sticky and plastic; common shiny films on faces of peds; thin continuous gray (10YR 5/1) coatings on top of columns; about 2 percent fine pebbles; slightly alkaline; clear smooth boundary.

Btnzg—11 to 19 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; common fine faint gray (10YR 5/1) iron depletions; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; very hard, very firm, very sticky and very plastic; few shiny films on faces of peds; common fine accumulations of salts; about 2 percent fine pebbles; slight effervescence; moderately alkaline; gradual wavy boundary.

Bkzg1—19 to 39 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; few fine faint gray (N 5/0) iron depletions; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; very hard, very firm, very sticky and very plastic; few fine accumulations of carbonate; few fine common fine accumulations of salts; strong effervescence; strongly alkaline; gradual wavy boundary.

Bkzg2—39 to 50 inches; light brownish gray (2.5Y 6/2) silty clay; grayish brown (2.5Y 5/2) moist; many medium faint gray (N 5/0) and few fine prominent very dark gray (N 3/0) iron depletions; weak medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, very firm, very sticky and very plastic; few fine iron and manganese concretions; common fine accumulations of carbonate; few fine accumulations of salts; strong effervescence; strongly alkaline; clear smooth boundary.

Bkg—50 to 60 inches; gray (5Y 6/1) silty clay, gray (5Y 5/1) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; common fine iron and manganese concretions; few coarse accumulations of carbonate; strong effervescence; strongly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 19 to 39 inches
Depth to carbonates: 3 to 16 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 5 to 15 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2

Texture—dominantly silt loam but loam in some pedons

E horizon:

Hue—10YR; value—5 or 6 (3 or 4 moist); and chroma—1 or 2

Texture—silt loam or loam

Btn horizon:

Hue—10YR or 2.5Y; value—3 to 6 (2 or 3 moist); and chroma—1 or 2

Texture—clay, silty clay, or clay loam

Bkzg horizon:

Hue—2.5Y or 5Y; value—5 or 6 (2 to 5 moist); and chroma—1 or 2

Texture—dominantly silty clay but silty clay loam, clay, or clay loam in some pedons

Some pedons do not have a Btkz horizon, and some pedons have a C horizon.

Eakin Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains and moraines
Parent material: Silty glacial till over loamy glacial till
Slope: 0 to 9 percent

Typical Pedon

Eakin silt loam, in an area of Eakin-Raber complex, 2 to 6 percent slopes, 300 feet north and 200 feet west of the southeast corner of sec. 23, T. 111 N., R. 73 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium and fine granular structure; slightly hard, very friable; neutral; abrupt smooth boundary.

Bt—7 to 14 inches; dark grayish brown (2.5Y 4/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium prismatic structure parting to weak medium and fine subangular blocky; hard, friable, slightly sticky and slightly plastic; few shiny films on faces of peds; neutral; clear smooth boundary.

Bk1—14 to 29 inches; light olive brown (2.5Y 5/4) silty clay loam, olive brown (2.5Y 4/4) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine and medium accumulations of carbonate; strong effervescence; slightly alkaline; clear smooth boundary.

2Bk2—29 to 45 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and medium accumulations of carbonate; about 2 percent fine pebbles; violent effervescence; moderately alkaline; clear wavy boundary.

2C1—45 to 53 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few fine accumulations of carbonate; about 2 percent fine pebbles; strong effervescence; moderately alkaline; clear wavy boundary.

2C2—53 to 60 inches; olive gray (5Y 5/2) clay loam, olive gray (5Y 4/2) moist; massive; hard, firm, sticky and plastic; few fine and medium nests of gypsum and other salts; about 2 percent fine pebbles; slight effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 10 to 18 inches
Depth to contrasting parent material: 20 to 40 inches over loamy glacial till
Depth to gypsum and other visible salts: More than 40 inches

A horizon:

Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2

Texture—silt loam

Bt horizon:

Hue—10YR or 2.5Y; value—4 or 5 (3 or 4 moist); and chroma—2 or 3

Texture—silty clay loam

Bk horizon:

Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4

Texture—silty clay loam or silt loam

2Bk horizon:

Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—1 to 4

Texture—clay loam or loam

2C horizon:

Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—1 to 4

Texture—clay loam or loam

Edwin Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate

Landform: Lake plains
Parent material: Silty glaciolacustrine sediments
Slope: 0 to 4 percent

Typical Pedon

Edwin silt loam (fig. 17), in an area of Bend-Edwin complex, 0 to 4 percent slopes, 275 feet south and 1,700 feet east of the northwest corner of sec. 18, T. 114 N., R. 71 W.

Ap—0 to 9 inches; dark grayish brown (2.5Y 4/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly plastic; common fine roots; slightly alkaline; abrupt smooth boundary.

Bk—9 to 27 inches; light yellowish brown (2.5Y 6/4) silt loam, light olive brown (2.5Y 5/4) moist; weak medium and coarse prismatic structure parting to moderate medium and coarse subangular blocky; very hard, friable, slightly plastic; common fine roots; strong effervescence; moderately alkaline; clear wavy boundary.

Cyz1—27 to 37 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/3) moist; massive; hard, friable; few fine roots in cracks; many fine platelike nests of gypsum; common fine threads of salt; slight effervescence; moderately alkaline; clear smooth boundary.

Cyz2—37 to 60 inches; pale yellow (2.5Y 7/3) silt loam that is varved with very thin layers of very fine sand to clay, light olive brown (2.5Y 5/3) moist; many medium and coarse distinct light gray (N 7/0) relic mottles; massive; hard, friable; varves 1 to 2 millimeters thick; common fine and medium prominent brown (7.5YR 4/4), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/6) iron stains; common fine cylindrical iron concretions; few fine platelike nests of gypsum; few fine threads of salt; slight effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 10 inches
Depth to carbonates: 7 to 10 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 16 to 37 inches

A horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly silt loam but loam in some pedons

Bk horizon:
Hue—2.5Y; value—5 to 7 (4 to 6 moist): and chroma—2 to 4
Texture—silt loam or loam

Cyz horizon:
Hue—2.5Y; value—6 or 7 (5 or 6 moist); and chroma—2 to 4
Texture—silt loam

Egas Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Clayey alluvium
Slope: 0 to 1 percent

Typical Pedon

Egas silty clay, in an area of Durrstein-Egas complex, 780 feet west and 75 feet south of the northeast corner of sec. 16, T. 112 N., R. 73 W.

A—0 to 4 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; weak coarse subangular blocky structure; extremely hard, very firm, very sticky and very plastic; slightly alkaline; clear smooth boundary.

ACyzg1—4 to 9 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; extremely hard, very firm, very sticky and very plastic; common fine and medium accumulations of gypsum and other salts; moderately alkaline; clear smooth boundary.

ACyzg2—9 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; massive; extremely hard, firm, very sticky and very plastic; many fine and medium accumulations of gypsum and other salts; strong effervescence; strongly alkaline; gradual wavy boundary.

Cg1—24 to 45 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; common distinct yellowish brown (10YR 5/4) iron masses; massive; very hard, firm, very sticky and very plastic; strong effervescence; strongly alkaline; gradual wavy boundary.

Cg2—45 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; common distinct yellowish brown (10YR 5/4) iron masses; massive; very hard, firm, very sticky and very plastic; few medium and coarse accumulations of carbonate; strong effervescence; strongly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 24 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 0 to 7 inches

A horizon:
Hue—10YR or 2.5Y; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly silty clay but silty clay loam in some pedons

AC horizon:
Hue—10YR or 5Y; value—4 to 6 (2 to 4 moist); and chroma—1 or 2
Texture—silty clay loam or silty clay

C horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 or 5 moist); and chroma—1 or 2
Texture—silty clay loam, silty clay, clay loam, or clay

Gettys Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Moraines and dissected plains
Parent material: Loamy glacial till
Slope: 9 to 40 percent

Typical Pedon

Gettys clay loam, in an area of Gettys-Sansarc complex, 9 to 40 percent slopes, 2,000 feet south and 1,120 feet east of the northwest corner of sec. 12, T. 109 N., R. 73 W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak fine and very fine granular; hard, friable, slightly sticky and slightly plastic; about 2 percent fine pebbles; strong effervescence; slightly alkaline; clear smooth boundary.

Bw—3 to 10 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak medium and fine subangular blocky; hard, friable, slightly sticky and slightly plastic; about 2 percent fine pebbles; carbonates on the underside of pebbles; strong effervescence; slightly alkaline; gradual smooth boundary.

Bk—10 to 24 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure parting to weak medium and fine subangular blocky; hard, firm, slightly sticky and slightly plastic; about 2 percent fine pebbles; common medium and coarse accumulations of carbonate; violent effervescence; slightly alkaline; clear wavy boundary.

C—24 to 43 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, slightly sticky and slightly plastic; about 2 percent fine pebbles; about 2 percent medium fragments of shale; violent effervescence; slightly alkaline; clear smooth boundary.

Cy—43 to 60 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; common fine and medium nests of gypsum; about 2 percent fine pebbles; about 2 percent fine fragments of shale; violent effervescence; slightly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 3 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 20 inches

A horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 to 4 moist); and chroma—1 or 2
Texture—clay loam

Bw horizon:
Hue—10YR or 2.5Y; value—5 or 6 (4 or 5 moist); and chroma—2 or 3
Texture—clay loam or clay

Bk horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—1 to 3
Texture—clay loam or clay

C horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—1 to 3
Texture—clay loam or clay

Glenham Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains and moraines
Parent material: Loamy glacial till
Slope: 0 to 9 percent

Typical Pedon

Glenham loam, in an area of Glenham-Prosper-Hoven complex, 0 to 4 percent slopes, 210 feet north and 2,500

feet east of the southwest corner of sec. 15, T. 114 N., R. 73 W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak medium granular structure; slightly hard, very friable; neutral; clear smooth boundary.

Bt1—3 to 7 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky; few shiny films on faces of peds; about 2 percent fine pebbles; neutral; clear wavy boundary.

Bt2—7 to 13 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure parting to strong medium subangular blocky; hard, friable, slightly sticky; few shiny films on faces of peds; about 2 percent fine pebbles; neutral; clear smooth boundary.

Bk1—13 to 18 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky; common fine and medium accumulations of carbonate; about 2 percent fine pebbles; strong effervescence; slightly alkaline; clear wavy boundary.

Bk2—18 to 32 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky; many fine accumulations of carbonate; about 2 percent fine pebbles; violent effervescence; slightly alkaline; clear wavy boundary.

C—32 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, slightly sticky and slightly plastic; about 2 percent fine and medium fragments of shale; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 19 inches
Depth to carbonates: 10 to 20 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 40 inches

A horizon:
Hue—10YR; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—loam

Bt horizon:
Hue—10YR or 2.5Y; value—4 or 5 (3 or 4 moist); and chroma—2 or 3
Texture—clay loam or loam

Bk horizon:
Hue—2.5Y or 10YR; value—5 or 6 (4 or 5 moist); and chroma—2 or 3
Texture—clay loam or loam

C horizon:
Hue—5Y, 2.5Y, or 10YR; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam or loam

Henkin Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Outwash plains
Parent material: Loamy glacial meltwater deposits
Slope: 0 to 4 percent

Typical Pedon

Henkin fine sandy loam, in an area of Henkin-Blendon fine sandy loams, 0 to 4 percent slopes, 1,800 feet south and 150 feet east of the northwest corner of sec. 5, T. 114 N., R. 71 W.

Ap—0 to 6 inches; dark gray (10YR 4/1) fine sandy loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, very friable; slightly acid; abrupt smooth boundary.

Bw1—6 to 11 inches; dark grayish brown (2.5Y 4/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak medium and coarse subangular blocky structure; slightly hard, friable; slightly acid; clear smooth boundary.

Bw2—11 to 18 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable; slightly acid; clear wavy boundary.

Bk—18 to 27 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; slightly hard, friable; many fine accumulations of carbonates; violent effervescence; moderately alkaline; clear wavy boundary.

C1—27 to 39 inches; light brownish gray (2.5Y 6/2) stratified loamy fine sand and fine sandy loam, grayish brown (2.5Y 5/2) moist; single grain; loose; strong effervescence; moderately alkaline; gradual wavy boundary.

C2—39 to 60 inches; light gray (2.5Y 7/2) stratified loamy fine sand and fine sandy loam, dark grayish brown (2.5Y 4/2) moist; single grain; loose; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 18 to 60 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR; value—3 or 4 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly fine sandy loam but loam or sandy loam in some pedons

Bw horizon:
Hue—10YR or 2.5Y; value—4 to 6 (3 to 5 moist); and chroma—2 or 3
Texture—fine sandy loam or sandy loam

Bk horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—fine sandy loam, sandy loam, or loam

C horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—stratified fine sand to clay loam

Highmore Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Till plains
Parent material: Silty glacial till
Slope: 0 to 6 percent

Typical Pedon

Highmore silt loam, in an area of Highmore-Eakin silt loams, 2 to 6 percent slopes, 80 feet north and 140 feet west of the southeast corner of sec. 2, T. 110 N., R. 72 W.

A—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, very friable; neutral; clear smooth boundary.

Bt1—7 to 13 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few shiny films on faces of peds; slightly alkaline; clear smooth boundary.

Bt2—13 to 24 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common shiny films on faces of peds; slightly alkaline; clear smooth boundary.

Bk1—24 to 31 inches; pale brown (10YR 6/3) silty clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common medium and coarse accumulations of carbonate; strong effervescence; slightly alkaline; gradual smooth boundary.

Bk2—31 to 39 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; weak coarse and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common medium and coarse accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C1—39 to 52 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable; few fine accumulations of carbonate; strong effervescence; slightly alkaline; gradual wavy boundary.

C2—52 to 60 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 9 to 20 inches
Depth to carbonates: 12 to 26 inches
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly silt loam but silty clay loam in some pedons

Bt horizon:
Hue—10YR or 2.5Y; value—4 or 5 (2 to 4 moist); and chroma—2 or 3
Texture—silty clay loam or silt loam

Bk horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—silty clay loam or silt loam

C horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—silty clay loam or silt loam

Some pedons have a 2C horizon.

Hoven Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Till plains
Parent material: Local clayey alluvium
Slope: 0 to 1 percent

Typical Pedon

Hoven silt loam, 210 feet south and 725 feet west of the northeast corner of sec. 11, T. 113 N., R. 72 W.

E—0 to 3 inches; gray (10YR 6/1) silt loam, very dark gray (10YR 3/1) moist; weak thin platy structure; soft, very friable; moderately acid; abrupt smooth boundary.

Btng1—3 to 7 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; strong medium columnar structure parting to moderate medium blocky; very hard, very firm, sticky and plastic; thin continuous gray (10YR 6/1) coatings on top of columns; few shiny films on faces of peds; slightly acid; gradual wavy boundary.

Btng2—7 to 25 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; few shiny films on faces of peds; slightly alkaline; gradual wavy boundary.

Bkg1—25 to 42 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; few fine accumulations of carbonate; slight effervescence; slightly alkaline; gradual smooth boundary.

Bkg2—42 to 55 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; very hard, very firm, sticky and plastic; few fine accumulations of carbonate; about 2 percent fine pebbles; strong effervescence; slightly alkaline; clear smooth boundary.

Cg—55 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, slightly sticky and slightly plastic; about 5 percent fine pebbles; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 27 to 60 inches
Depth to carbonates: 10 to 30 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 7 inches

E horizon:
Hue—10YR; value—5 to 7 (2 to 4 moist); and chroma—1 or 2
Texture—dominantly silt loam but silty clay loam in some pedons

Bt horizon:
Hue—10YR or 2.5Y; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly silty clay or clay but silty clay loam or clay loam in some pedons

Bk horizon:
Hue—10YR or 2.5Y; value—4 to 6 (3 to 4 moist); and chroma—1 or 2
Texture—silty clay, silty clay loam, or clay loam

C horizon:
Hue—10YR, 2.5Y, or 5Y; value—4 to 7 (3 to 5 moist); and chroma—1 to 3
Texture—clay loam, clay, silty clay, or silty clay loam

Some pedons have a Btk horizon.

Hurley Series

Depth to bedrock: Moderately deep
Drainage class: Well drained
Permeability: Very slow
Landform: Plains
Parent material: Clayey residuum weathered from shale
Slope: 0 to 6 percent

Typical Pedon

Hurley silt loam, 0 to 6 percent slopes, 310 feet west and 2,380 feet south of the northeast corner of sec. 20, T. 106 N., R. 69 W., in Buffalo County:

E—0 to 2 inches; light brownish gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to weak fine granular; soft, very friable; neutral; abrupt smooth boundary.

Btn1—2 to 4 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium columnar structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; few shiny films on faces of peds; moderately alkaline; abrupt smooth boundary.

Btn2—4 to 8 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; very hard, very firm, sticky and plastic; few shiny films on faces of peds; moderately alkaline; abrupt wavy boundary.

Bkz—8 to 14 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic

structure parting to moderate fine and medium subangular blocky; very hard, very firm, sticky and plastic; common fine accumulations of carbonate; common fine accumulations of salts; strong effervescence; moderately alkaline; clear wavy boundary.

Bkyz—14 to 21 inches; grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) and grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; very hard, very firm, sticky and plastic; common fine and medium accumulations of carbonate; common fine and medium accumulations of gypsum; common fine accumulations of salts; strong effervescence; moderately alkaline; gradual wavy boundary.

Cyz—21 to 30 inches; light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) clay, grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky and plastic; few fine yellowish brown (10YR 5/6) iron stains; few fine accumulations of carbonate; many fine and medium accumulations of gypsum; common fine accumulations of salts; strong effervescence; moderately alkaline; gradual wavy boundary.

Cr—30 to 60 inches; light gray (2.5Y 7/2) and olive yellow (2.5Y 6/6) shale, grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) moist; common fine and medium nests of gypsum and other salts; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 28 inches
Depth to carbonates: 4 to 12 inches
Depth to contrasting parent material: 20 to 40 inches over shale
Depth to gypsum and other visible salts: 4 to 16 inches

E horizon:
Hue—10YR, 2.5Y, or 5Y; value—4 to 6 (3 or 4 moist); and chroma—1 or 2
Texture—dominantly silt loam but silty clay loam in some pedons

Btn horizon:
Hue—10YR, 2.5Y, or 5Y; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—clay

Bkz horizon:
Hue—10YR, 2.5Y, or 5Y; value—5 or 6 (4 or 5 moist); and chroma—1 or 2
Texture—clay

C horizon:
Hue—2.5Y or 5Y; value—5 or 6 (4 or 5 moist); and chroma—1 or 2
Texture—clay

Cr horizon:
Hue—10YR, 2.5Y, or 5Y; value—5 to 7 (4 to 6 moist), and chroma—2 to 6
Texture—shale

Java Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains and moraines
Parent material: Loamy glacial till
Slope: 1 to 40 percent

Typical Pedon

Java loam (fig. 18), in an area of Java-Betts loams, 6 to 15 percent slopes, 75 feet south and 800 feet west of the northeast corner of sec. 34, T. 116 N., R. 73 W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine and medium granular structure; soft, friable, slightly sticky; about 2 percent fine pebbles; neutral; clear smooth boundary.

Bw—4 to 9 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; about 2 percent fine pebbles; neutral; clear smooth boundary.

Bk1—9 to 14 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common medium and coarse accumulations of carbonate; about 2 percent fine pebbles; strong effervescence; slightly alkaline; gradual wavy boundary.

Bk2—14 to 30 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium and coarse accumulations of carbonate; about 2 percent fine pebbles and shale fragments; violent effervescence; slightly alkaline; gradual wavy boundary.

C—30 to 60 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable, slightly sticky; about 2 percent fine pebbles and shale fragments; strong effervescence; slightly alkaline.

Figure 15.—Profile of Bend loam. These soils have a surface layer about 8 inches thick, a subsoil that is calcareous below a depth of 13 inches, and an underlying layer below a depth of 38 inches. Depth is marked in feet.

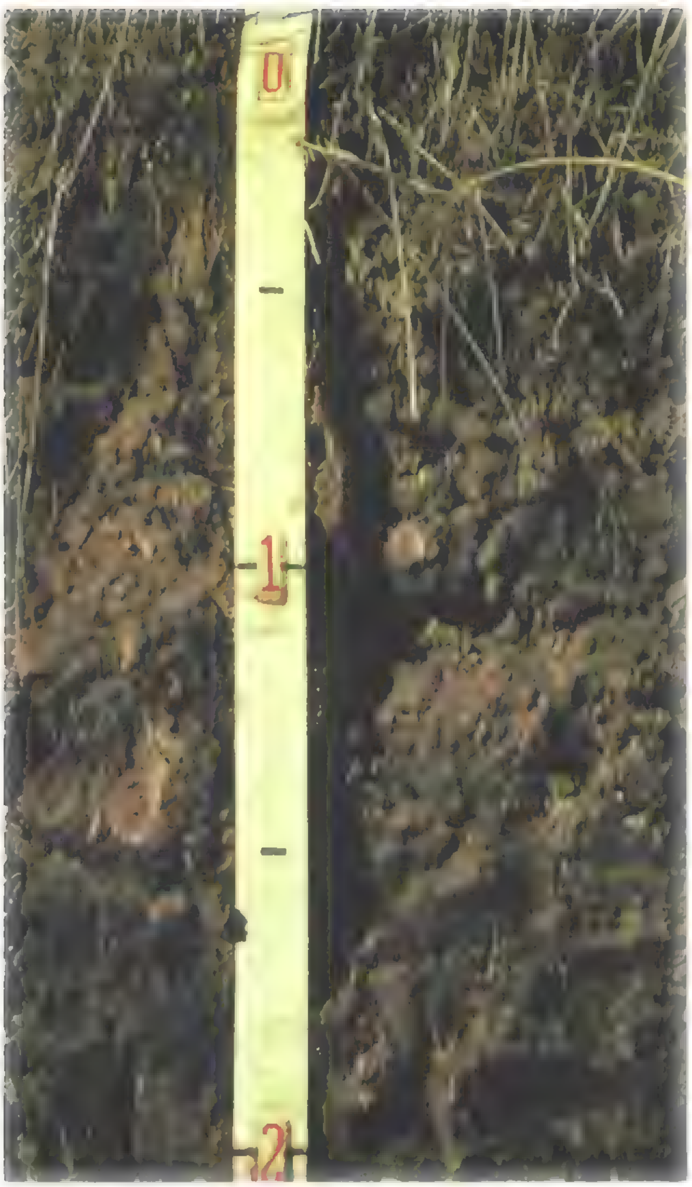

Figure 16.—Profile of Bullcreek clay. These soils consist of calcareous clay throughout. Depth is marked in feet.

Figure 17.—Profile of Edwin silt loam. These soils have a calcareous subsoil at a depth of about 9 inches and varved lacustrine sediments below a depth of 37 inches. Depth is marked in feet.

Figure 18.—Profile of Java loam. These soils are calcareous at a depth of about 9 inches. The underlying material is at a depth of about 30 inches. Depth is marked in feet.

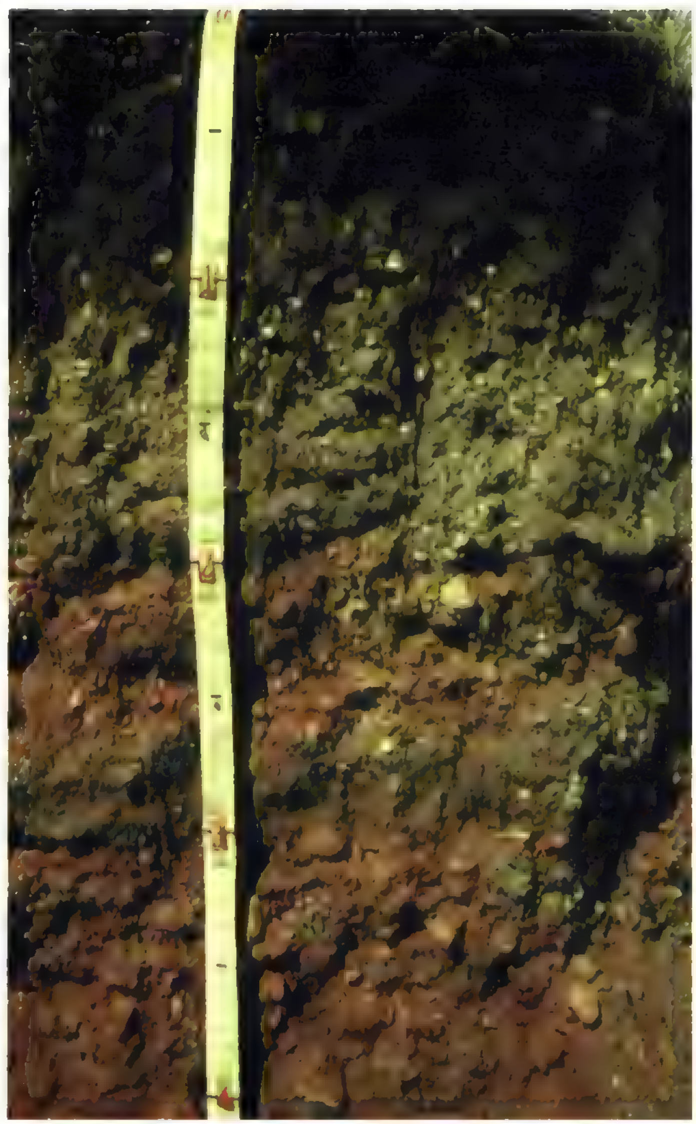

Figure 19.—Profile of Oahe loam. These soils have gravelly material at a depth of 20 to 40 inches. Depth is marked in feet.

Figure 20.—Profile of Sansarc clay. These soils have bedded shale at a depth of 10 to 20 inches. Depth is marked in feet.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 10 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 18 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly loam but clay loam in some pedons

Bw horizon:
Hue—10YR or 2.5Y; value—4 or 5 (2 or 3 moist); and chroma—2 or 3
Texture—clay loam or loam

Bk horizon:
Hue—10YR, 2.5Y, or 5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam or loam

C horizon:
Hue—10YR, 2.5Y, or 5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam or loam

Jerauld Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 4 percent

Typical Pedon

Jerauld loam, in an area of Cavo-Jerauld loams, 0 to 4 percent slopes, 80 feet north and 2,400 feet west of the southeast corner of sec. 19, T. 111 N., R. 72 W.

A—0 to 2 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to weak fine granular; soft, very friable; slightly acid; abrupt smooth boundary.

E—2 to 5 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak thin platy structure; soft, very friable; neutral; abrupt smooth boundary.

Btn—5 to 10 inches; dark grayish brown (10YR 4/2) clay loam, very dark gray (10YR 3/1) moist; moderate medium and fine columnar structure parting to moderate medium and fine subangular blocky; very hard, firm, sticky and plastic; few shiny films on faces of peds; about 2 percent fine pebbles; slightly alkaline; clear wavy boundary.

Bkz1—10 to 17 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few fine accumulations of carbonate; few fine nests of gypsum and other salts; about 2 percent fine pebbles; slight effervescence; moderately alkaline; clear wavy boundary.

Bkz2—17 to 33 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium and fine subangular blocky structure; very hard, firm, sticky and plastic; common fine accumulations of carbonate; common fine nests of gypsum and other salts; about 2 percent fine pebbles; strong effervescence; moderately alkaline, gradual wavy boundary.

Cyz—33 to 60 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; massive; very hard, firm, sticky and plastic; common fine nests of gypsum and other salts; about 2 percent fine pebbles; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 9 to 15 inches
Depth to carbonates: 8 to 15 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 8 to 15 inches

A horizon:
Hue—10YR or 2.5Y; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly loam but silt loam in some pedons

E horizon:
Hue—10YR or 2.5Y; value—5 to 7 (3 to 5 moist); and chroma—1 or 2
Texture—loam, silt loam, or silty clay loam

Bt horizon:
Hue—10YR or 2.5Y; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—clay loam, clay, or silty clay

Bkz horizon:
Hue—10YR or 2.5Y; value—4 to 6 (3 to 5 moist); and chroma—1 to 3
Texture—clay loam, clay, or silty clay

C horizon:
Hue—10YR, 2.5Y, or 5Y; value—5 to 7 (4 to 6 moist); and chroma—1 to 4
Texture—clay loam, clay, or silty clay

Kolls Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Plains
Parent material: Local clayey alluvium
Slope: 0 to 1 percent

Typical Pedon

Kolls clay, 2,400 feet south and 1,250 feet east of the northwest corner of sec. 20, T. 109 N., R. 72 W.

A—0 to 2 inches; dark gray (N 4/0) clay, very dark gray (N 3/0) moist; weak fine and medium subangular blocky structure; very hard, firm, sticky and plastic; cracks 1/2 to 1 inch wide; neutral; clear smooth boundary.

Bg—2 to 16 inches; dark gray (N 4/0) clay, very dark gray (N 3/0) moist; moderate medium and coarse subangular blocky structure; extremely hard, extremely firm, sticky and plastic; cracks 1/2 to 1 inch wide; few fine accumulations of carbonate; slight effervescence; slightly alkaline; gradual wavy boundary.

Bssg—16 to 29 inches; gray (N 5/0) clay, very dark gray (N 3/0) moist; weak medium and coarse subangular blocky structure; extremely hard, extremely firm, sticky and plastic; cracks 1/2 to 1 inch wide; common distinct slickensides; common fine accumulations of carbonate; slight effervescence; moderately alkaline; gradual wavy boundary.

Bssyg—29 to 39 inches; gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; weak coarse prismatic structure; extremely hard, extremely firm, sticky and plastic; cracks 1/2 inch wide; few distinct nonintersecting slickensides; few fine accumulations of carbonate; few medium accumulations of gypsum; slight effervescence; moderately alkaline; gradual wavy boundary.

Cyg—39 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, extremely firm, sticky and plastic; few fine accumulations of carbonate; few fine accumulations of gypsum; strong effervescence; strongly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 3 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 20 inches

A horizon:
Hue—10YR, 2.5Y, or neutral; value—4 or 5 (2 or 3 moist); and chroma—0 or 1
Texture—dominantly clay but silty clay in some pedons

Bg horizon:
Hue—2.5Y, 5Y, or neutral; value—4 or 5 (2 or 3 moist); and chroma—0 or 1
Texture—clay

Cg horizon:
Hue—2.5Y, 5Y, or neutral; value—4 to 6 (3 to 5 moist); and chroma—0 to 3
Texture—clay

Lawet Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Moderately slow
Landform: Flood plains
Parent material: Loamy alluvium
Slope: 0 to 2 percent

Typical Pedon

Lawet loam, 1,000 feet north and 950 feet west of the southeast corner of sec. 35, T. 116 N., R. 71 W.

Ap—0 to 7 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak fine granular structure; slightly hard, very friable; strong effervescence; moderately alkaline; abrupt smooth boundary.

ABk—7 to 13 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak medium and coarse subangular blocky structure; very hard, friable, sticky and plastic; fine and medium accumulations of carbonate; violent effervescence; moderately alkaline; clear smooth boundary.

Bkg1—13 to 23 inches; light brownish gray (2.5Y 6/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; weak medium and coarse subangular blocky structure; hard, firm, sticky and plastic; many medium and coarse accumulations of carbonate; about 5 percent fine pebbles; violent effervescence; moderately alkaline; gradual wavy boundary.

Bkg2—23 to 33 inches; gray (10YR 5/1) silty clay loam, dark gray (10YR 4/1) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common medium and coarse accumulations of carbonate; about 2 percent fine pebbles; strong effervescence; moderately alkaline; gradual wavy boundary.

Cg1—33 to 46 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, very firm, sticky and plastic; many fine concretions of iron and manganese; common medium and few coarse accumulations of carbonate; about 2 percent fine pebbles; strong effervescence; moderately alkaline; gradual wavy boundary.

Cg2—46 to 60 inches; light brownish gray (2.5Y 6/2) clay

loam, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, very firm, sticky and plastic; few fine concretions of iron and manganese; common fine and medium accumulations of carbonate; about 2 percent fine pebbles; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 24 inches
Depth to carbonates: 0 to 3 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR, 2.5Y, or neutral; value—3 to 5 (2 or 3 moist); and chroma—0 or 1
Texture—loam

Bk horizon:
Hue—10YR, 2.5Y, or neutral; value—5 or 6 (4 or 5 moist); and chroma—0 to 2
Texture—sandy clay loam, silty clay loam, or clay loam

C horizon:
Hue—10YR, 2.5Y, 5Y, or neutral; value—5 to 7 (4 to 7 moist); and chroma—0 to 2
Texture—clay loam, sandy clay loam, or sandy loam

Macken Series

Depth to bedrock: Very deep
Drainage class: Poorly and very poorly drained
Permeability: Slow
Landform: Till plains
Parent material: Local clayey alluvium
Slope: 0 to 1 percent

Typical Pedon

Macken silty clay loam, 1,190 feet south and 260 feet east of the northwest corner of sec. 17, T. 114 N., R. 73 W.

A—0 to 4 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, sticky and plastic; many distinct yellowish brown (10YR 5/4) iron masses; neutral; clear smooth boundary.

Bg—4 to 34 inches; gray (N 5/0) silty clay, very dark gray (N 3/0) moist; weak medium prismatic structure parting to moderate medium angular blocky; very hard, very firm, very sticky and very plastic; cracks 1/2 to 1 inch wide; neutral; gradual smooth boundary.

Bkg1—34 to 46 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate medium angular blocky; very hard, very firm, very sticky and very plastic; cracks 1/2 to 1 inch wide; few fine accumulations of carbonate in the lower part; slight effervescence; slightly alkaline; clear smooth boundary.

Bkg2—46 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak medium prismatic structure parting to weak coarse subangular blocky; hard, firm, sticky and plastic; many fine distinct yellowish brown (10YR 5/4) and few fine prominent yellowish brown (10YR 5/6) iron masses; few medium and coarse concretions of iron and manganese; many fine and medium accumulations of carbonate; about 2 percent fine pebbles; violent effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 22 to 34 inches
Depth to carbonates: 12 to 40 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR or 2.5Y; value—4 or 5 (2 or 3 moist); and chroma—0 or 1
Texture—dominantly silty clay loam but silty clay in some pedons

Bg horizon:
Hue—10YR, 2.5Y, 5Y, or neutral; value—4 or 5 (2 or 3 moist); and chroma—0 or 1
Texture—silty clay or clay

Bkg horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—1 to 3
Texture—silty clay loam, silty clay, or clay

Oahe Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate in the subsoil and very rapid in the underlying layer
Landform: Outwash plains
Parent material: Loamy alluvium or outwash sediments overlying sand and gravel
Slope: 0 to 6 percent

Typical Pedon

Oahe loam (fig. 19), in an area of Oahe-Delmont loams, 0 to 2 percent slopes, 2,400 feet south and 1,900 feet west of the northeast corner of sec. 30, T. 111 N., R. 73 W.

A—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak medium and coarse subangular blocky structure parting to weak fine and medium subangular blocky; soft, very friable; about 2 percent fine pebbles; slightly acid; gradual smooth boundary.

Bw1—7 to 17 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium and coarse subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; about 2 percent fine pebbles; neutral; clear smooth boundary.

Bw2—17 to 23 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; about 2 percent fine pebbles; neutral; gradual smooth boundary.

Bk—23 to 33 inches; grayish brown (2.5Y 5/2)) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; soft, friable, slightly sticky and slightly plastic; many fine accumulations of carbonate; about 2 percent fine pebbles; violent effervescence; slightly alkaline; abrupt smooth boundary.

2C—33 to 60 inches; yellowish brown (10YR 5/4) gravelly sand, brown (10YR 4/3) moist; single grain; loose; about 30 percent gravel, by volume; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: 10 to 25 inches
Depth to contrasting parent material: 20 to 40 inches over sand and gravel
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—loam

Bw horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 to 4 moist); and chroma—1 or 2
Texture—loam or clay loam

Bk horizon:
Hue—10YR or 2.5Y; value—4 to 6 (3 to 5 moist); and chroma—2 to 4
Texture—loam or sandy loam

2C horizon:
Hue—10YR or 2.5Y; value—5 to 8 (4 to 7 moist); and chroma—2 to 4
Texture—gravelly sand, very gravelly sand, or very gravelly loamy sand

Oko Series

Depth to bedrock: Deep or very deep
Drainage class: Well drained
Permeability: Slow
Landform: Plains and dissected plains
Parent material: Clayey glacial till
Slope: 2 to 20 percent

Typical Pedon

Oko clay loam, 6 to 9 percent slopes, 2,595 feet north and 475 feet east of the southwest corner of sec. 13, T. 109 N., R. 72 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) clay loam, black (10YR 2/1) moist; weak coarse and medium subangular blocky structure; hard, friable, sticky and plastic; neutral; clear smooth boundary.

Bt—4 to 10 inches; dark grayish brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; hard, firm, sticky and plastic; many very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few shiny films on faces of peds; cracks 1/4 to 1/2 inch wide; neutral; clear smooth boundary.

Btk—10 to 19 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; common very dark grayish brown (10YR 3/2) organic coats on faces of peds; few shiny films on faces of peds; cracks 1/4 inch wide; few fine accumulations of carbonate; strong effervescence; slightly alkaline; gradual smooth boundary.

Bk1—19 to 26 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse and medium subangular blocky structure; very hard, firm, sticky and plastic; few fine accumulations of carbonate; cracks less than 1/4 inch wide; about 2 percent fine fragments of shale; strong effervescence; slightly alkaline; gradual wavy boundary.

Bk2—26 to 34 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; few fine accumulations of carbonate; about 2 percent fine fragments of shale; strong effervescence; slightly alkaline; gradual smooth boundary.

C—34 to 41 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; hard,

firm, sticky and plastic; few fine nests of gypsum; strong effervescence; slightly alkaline; gradual wavy boundary.

Cr—41 to 60 inches; light brownish gray (2.5Y 6/2) shale, dark grayish brown (2.5Y 4/2) moist; common fine gypsum crystals along shale planes; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 5 to 16 inches
Depth to contrasting parent material: 40 to more than 60 inches over shale
Depth to gypsum and other visible salts: More than 20 inches

A horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly clay loam but loam in some pedons

Bt horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 to 4 moist); and chroma—1 or 2
Texture—clay or clay loam

Btk horizon:
Hue—10YR or 2.5Y; value—4 or 5 (3 or 4 moist); and chroma—1 or 2
Texture—clay

Bk horizon:
Hue—10YR, 2.5Y, or 5Y; value—5 or 6 (3 to 5 moist); and chroma—1 to 3
Texture—clay

C horizon:
Hue—2.5Y or 5Y; value—5 or 6 (3 to 5 moist); and chroma—1 to 3
Texture—clay

Cr horizon:
Hue—2.5Y or 5Y; value—5 or 6 (3 to 5 moist); and chroma—1 to 3
Texture—shale

Onita Series

Depth to bedrock: Very deep
Drainage class: Well drained and moderately well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Local clayey and loamy alluvium
Slope: 0 to 2 percent

Typical Pedon

Onita silt loam, 0 to 2 percent slopes, 995 feet north and 2,415 feet east of the southwest corner of sec. 25, T. 116 N., R. 73 W.

Ap—0 to 6 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, friable, slightly sticky and slightly plastic; neutral; abrupt smooth boundary.

A—6 to 15 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak coarse subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; neutral; clear smooth boundary.

Bt1—15 to 28 inches; dark grayish brown (2.5Y 4/2) silty clay loam; very dark grayish brown (2.5Y 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common shiny films on faces of peds; neutral; clear wavy boundary.

Bt2—28 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common shiny films on faces of peds; common very dark grayish brown (2.5Y 3/2) organic coatings on faces of peds; neutral; clear wavy boundary.

Bk1—33 to 42 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and plastic; few medium and common fine accumulations of carbonate; violent effervescence; moderately alkaline; gradual wavy boundary.

Bk2—42 to 50 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few distinct gray (10YR 6/1) iron depletions; common medium and coarse accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

BC—50 to 60 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; few distinct gray (10YR 6/1) iron depletions; common medium and coarse accumulations of carbonate; slight effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 25 to 40 inches

Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly silt loam but loam or silty clay loam in some pedons

Bt horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 to 4 moist); and chroma—1 to 3
Texture—silty clay loam or silty clay

Bk horizon:
Hue—10YR or 2.5Y; value—4 to 6 (3 to 5 moist); and chroma—2 to 4
Texture—silt loam or silty clay loam

Some pedons do not have a BC horizon, and some pedons have a C horizon.

Opal Series

Depth to bedrock: Moderately deep
Drainage class: Well drained
Permeability: Very slow
Landform: Plains and dissected plains
Parent material: Clayey residuum weathered from shale
Slope: 2 to 25 percent

Typical Pedon

Opal clay, 2 to 6 percent slopes, 2,640 feet south and 1,250 feet east of the northwest corner of sec. 24, T. 109 N., R. 72 W.

Ap—0 to 5 inches; dark grayish brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure parting to weak medium and fine granular; hard, firm, sticky and plastic; neutral; abrupt smooth boundary.

Bss—5 to 13 inches; dark grayish brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; weak coarse and medium subangular blocky structure; very hard, firm, sticky and plastic; few intersecting slickensides; cracks 1 inch wide; slight effervescence; slightly alkaline; clear smooth boundary.

Bssk—13 to 19 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few intersecting slickensides; cracks 1/2 to 1 inch wide; common fine and medium accumulations of carbonate; strong effervescence; slightly alkaline; gradual smooth boundary.

BC—19 to 23 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; very hard, firm, sticky and plastic; about 20 percent fragments of shale; few medium accumulations of carbonate; strong effervescence; slightly alkaline; gradual smooth boundary.

C—23 to 28 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; about 50 percent fragments of shale; few fine accumulations of carbonate; violent effervescence; slightly alkaline; clear smooth boundary.

Cr—28 to 60 inches; olive gray (5Y 5/2) shale, olive gray (5Y 4/2) moist; light yellowish brown (2.5Y 6/4) coatings in seams; slight effervescence; slightly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 8 inches
Depth to contrasting parent material: 20 to 40 inches over shale
Depth to gypsum and other visible salts: More than 20 inches

A horizon:
Hue—10YR, 2.5Y, or 5Y; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly clay but silty clay in some pedons

Bss horizon:
Hue—2.5Y or 5Y; value—4 to 6 (2 to 4 moist); and chroma—2 or 3
Texture—clay

Bkss horizon:
Hue—2.5Y or 5Y; value—4 to 6 (3 to 5 moist); and chroma—2 to 4
Texture—clay

C horizon:
Hue—2.5Y or 5Y; value—5 or 6 (4 or 5 moist); and chroma—1 to 3
Texture—clay

Cr horizon:
Hue—2.5Y or 5Y; value—5 to 7 (3 to 6 moist); and chroma—1 to 3
Texture—shale

Orton Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate in the subsoil and very rapid in the underlying layer

Landform: Moraines
Parent material: Loamy alluvium or outwash sediments
Slope: 9 to 25 percent

Typical Pedon

Orton loam, in an area of Orton-Talmo loams, 9 to 25 percent slopes, 2,515 feet south and 810 feet west of the northeast corner of sec. 4, T. 109 N., R. 72 W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak medium granular; soft, very friable; about 2 percent fine pebbles; slightly acid; clear smooth boundary.
Bw—4 to 12 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; slightly hard, very friable; about 2 percent fine pebbles; neutral; clear smooth boundary.
Bk—12 to 26 inches; brown (10YR 5/3) stratified loam and sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; slightly hard, very friable; many fine and medium accumulations of carbonate; about 10 percent gravel, by volume; strong effervescence; slightly alkaline; clear smooth boundary.
2C—26 to 60 inches; pale brown (10YR 6/3) gravelly sand, brown (10YR 4/3) moist; single grain; loose; about 15 percent gravel, by volume; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 15 inches
Depth to carbonates: 10 to 20 inches
Depth to contrasting parent material: 20 to 40 inches over sand and gravel
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—2
Texture—dominantly loam but fine sandy loam in some pedons

Bw horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—2 or 3
Texture—loam or fine sandy loam

Bk horizon:
Hue—10YR or 2.5Y; value—5 or 6 (4 or 5 moist); and chroma—2 or 3
Texture—dominantly loam and sandy loam but fine sandy loam and gravelly sandy loam in some pedons

2C horizon:
Hue—10YR or 2.5Y; value—4 to 7 (3 to 6 moist); and chroma—2 to 4
Texture—gravelly sand

Peno Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Till plains and moraines
Parent material: Clayey glacial till
Slope: 2 to 25 percent

Typical Pedon

Peno loam, in an area of Raber-Peno loams, 2 to 6 percent slopes, 450 feet north and 180 feet west of the southeast corner of sec. 23, T. 111 N., R. 73 W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium and fine granular structure; soft, friable; about 2 percent fine pebbles; neutral; abrupt smooth boundary.
Bt—5 to 9 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few percent shiny films on faces of peds; about 2 percent fine pebbles; neutral; clear wavy boundary.
Bk1—9 to 20 inches, grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse and medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; common medium and fine accumulations of carbonate; about 5 percent fine pebbles; violent effervescence; sl ghtly alkaline; clear wavy boundary.
Bk2—20 to 45 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine accumulations of carbonate; about 5 percent fine pebbles; violent effervescence; moderately alkaline; gradual wavy boundary.
C—45 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine olive yellow (2.5Y 6/8) iron stains; about 5 percent fine pebbles and shale fragments; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 10 inches
Depth to carbonates: 6 to 10 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 20 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly loam but clay loam in some pedons

Bt horizon:
Hue—10YR; value—3 to 5 (2 to 4 moist); and chroma—1 or 2
Texture—clay loam or clay

Bk horizon:
Hue—10YR or 2.5Y; value—5 or 6 (4 or 5 moist); and chroma—1 to 4
Texture—clay loam or clay

C horizon:
Hue—10YR or 2.5Y; value—5 or 6 (4 or 5 moist); and chroma—1 to 4
Texture—clay loam or clay

Plankinton Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Till plains
Parent material: Local clayey alluvium
Slope: 0 to 1 percent

Typical Pedon

Plankinton silt loam, 1,310 feet north and 660 feet west of the southeast corner of sec. 17, T. 116 N., R. 73 W.

A—0 to 3 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak thin platy structure parting to weak fine granular; soft, very friable; neutral; abrupt smooth boundary.

E—3 to 8 inches; light gray (10YR 7/1) silt loam, gray (10YR 5/1) moist; weak medium platy structure parting to weak fine and medium subangular blocky; soft, very friable; common prominent yellowish brown (10YR 5/4) iron masses; slightly acid; abrupt smooth boundary.

Btg1—8 to 16 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few shiny films on faces of peds; slightly acid; gradual smooth boundary.

Btg2—16 to 29 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate medium blocky; very hard, firm, sticky and plastic; few shiny films on faces of peds; slightly acid; gradual wavy boundary.

Bkg1—29 to 40 inches; olive gray (5Y 5/2) silty clay loam, dark olive gray (5Y 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; common prominent yellowish brown (10YR 5/4) iron masses; slight effervescence; slightly alkaline; clear wavy boundary.

Bkg2—40 to 51 inches; gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; moderate medium prismatic structure parting to moderate medium blocky; very hard, firm, sticky and plastic; few distinct yellowish brown (10YR 5/4) iron masses; few fine accumulations of carbonate; slight effervescence; slightly alkaline; clear wavy boundary.

Cg—51 to 60 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; massive; hard, firm, slightly sticky and slightly plastic; common distinct gray (10YR 6/1) and (10YR 5/1) iron depletions; common fine concretions of iron and manganese; few fine accumulations of carbonate; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 50 inches
Depth to carbonates: 24 to 50 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 28 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—silt loam

E horizon:
Hue—10YR; value—5 to 7 (4 or 5 moist); and chroma—1 or 2
Texture—silt loam

Bt horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 or 3 moist); and chroma—0 to 2
Texture—silty clay

Bk horizon:
Hue—10YR, 2.5Y, 5Y, or neutral; value—4 to 6 (3 to 5 moist); and chroma—0 to 3
Texture—silty clay loam, clay, or silty clay

C horizon:

Hue—2.5Y or 5Y; value—4 to 7 (3 to 5 moist); and chroma—1 to 4

Texture—dominantly clay loam but silty clay loam, silty clay, or clay in some pedons

Promise Series

Depth to bedrock: Deep or very deep
Drainage class: Well drained
Permeability: Very slow
Landform: Plains
Parent material: Clayey sediments weathered from shale
Slope: 0 to 6 percent

Typical Pedon

Promise silty clay, 0 to 2 percent slopes, 2,560 feet south and 1,150 feet east of the northwest corner of sec. 27, T. 109 N., R. 72 W.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) silty clay, black (10YR 2/1) moist; weak coarse subangular blocky structure parting to weak fine and medium subangular blocky; hard, firm, slightly sticky and slightly plastic; slightly acid; abrupt smooth boundary.

A—4 to 8 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure parting to weak medium subangular blocky; cracks 1/4 inch to 2 inches wide; very few intersecting slickensides; common tongues, very dark brown (10YR 2/2) moist; hard, firm, sticky and plastic; neutral; gradual wavy boundary.

Bss—8 to 19 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; moderate coarse subangular blocky structure parting to moderate medium angular and subangular blocky; very hard, very firm, sticky and plastic; cracks 1/4 inch to 2 inches wide; common intersecting slickensides; few tongues, very dark brown (10YR 2/2) moist; strong effervescence; slightly alkaline; gradual smooth boundary.

Bssk—19 to 27 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium and coarse subangular blocky structure parting to weak fine and medium subangular blocky; very hard, very firm, sticky and plastic; cracks 1/4 inch to 2 inches wide; few intersecting slickensides; few fine accumulations of carbonate; violent effervescence; moderately alkaline; gradual wavy boundary.

C—27 to 37 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky and plastic; few fine accumulations of carbonate; violent effervescence; moderately alkaline; gradual smooth boundary.

Cy1—37 to 43 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky and plastic; few fine accumulations of carbonate; common fine and medium accumulations of gypsum; violent effervescence; slightly alkaline; gradual smooth boundary.

Cy2—43 to 50 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few fine accumulations of carbonate; many fine and medium accumulations of gypsum; strong effervescence; slightly alkaline; clear smooth boundary.

Cy3—50 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine accumulations of gypsum; strong effervescence; slightly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 15 inches
Depth to contrasting parent material: 40 to more than 60 inches over shale
Depth to gypsum and other visible salts: More than 30 inches

A horizon:

Hue—10YR or 2.5Y; value—4 or 5 (2 or 3 moist); and chroma—1 or 2

Texture—dominantly silty clay but clay in some pedons

Bss horizon:

Hue—2.5Y or 5Y; value—4 to 6 (2 to 4 moist); and chroma—2 to 4

Texture—clay

Bk horizon:

Hue—2.5Y or 5Y; value—5 to 6 (4 to 5 moist); and chroma—2 to 4

Texture—clay

C horizon:

Hue—2.5Y or 5Y; value—5 or 6 (4 or 5 moist); and chroma—2 to 4

Texture—clay, silty clay, or silty clay loam

Prosper Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Till plains and moraines

Parent material: Loamy glacial till mantled with local alluvium
Slope: 0 to 6 percent

Typical Pedon

Prosper loam, in an area of Glenham-Prosper-Java loams, 1 to 6 percent slopes, 800 feet south and 350 feet west of the northeast corner of sec. 6, T. 115 N., R. 72 W.

Ap—0 to 6 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak medium subangular block structure parting to weak fine granular; slightly hard, friable; about 2 percent fine pebbles; neutral; abrupt smooth boundary.

A—6 to 13 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable; about 2 percent fine pebbles; neutral; clear smooth boundary.

Bt—13 to 28 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; few shiny films on faces of peds; about 2 percent fine pebbles; slightly alkaline; clear smooth boundary.

Bk—28 to 36 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; very hard, firm, sticky and plastic; common fine and medium accumulations of carbonate; 5 percent fine pebbles; violent effervescence; moderately alkaline; gradual wavy boundary.

C—36 to 60 inches; pale yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; about 5 percent fine pebbles; violent effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 30 inches
Depth to carbonates: 20 to 36 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 40 inches

A horizon:
Hue—10 YR; value—3 or 4 (2 or 3 moist); and chroma—1 or 2
Texture—loam

Bt horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 to 4 moist); and chroma—1 to 3
Texture—silty clay loam or clay loam

Bk horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam or loam

C horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam or loam

Raber Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Till plains and moraines
Parent material: Clayey glacial till
Slope: 0 to 9 percent

Typical Pedon

Raber loam, 2 to 6 percent slopes, 2,580 feet south and 165 feet west of the northeast corner of sec. 21, T. 110 N., R. 72 W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; moderate fine granular structure; soft, friable; 5 percent fine pebbles; neutral; clear smooth boundary.

Bt1—5 to 10 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few shiny films on faces of peds; neutral; gradual smooth boundary.

Bt2—10 to 17 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse and medium prismatic structure parting to moderate coarse and medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few shiny films on faces of peds; common patchy very dark grayish brown (10YR 3/2) organic coats on faces of peds; about 5 percent fine pebbles; neutral; clear smooth boundary.

Btk—17 to 32 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few shiny films on faces of peds; many medium and coarse accumulations of carbonate; about 5 percent fine pebbles; violent effervescence; slightly alkaline; clear wavy boundary.

Bk—32 to 41 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, slightly sticky

and slightly plastic; common fine and medium accumulations of carbonate; about 10 percent pebbles, by volume; violent effervescence; slightly alkaline; gradual wavy boundary.

C—41 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine accumulations of carbonate; about 10 percent pebbles, by volume; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 16 inches
Depth to carbonates: 12 to 20 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly loam but clay loam in some pedons

Bt horizon:
Hue—10YR or 2.5Y; value—4 or 5 (2 to 4 moist); and chroma—2 or 3
Texture—clay loam or clay

Bk horizon:
Hue—2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam

C horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam

Ree Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Terraces
Parent material: Loamy alluvial sediments
Slope: 0 to 2 percent

Typical Pedon

Ree loam, 0 to 2 percent slopes, 175 feet south and 240 feet east of the northwest corner of sec. 9, T. 109 N., R. 72 W.

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium and fine subangular blocky structure parting to weak medium and fine granular; slightly hard, very friable; slightly acid; abrupt smooth boundary.

Bt1—4 to 10 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; neutral; clear smooth boundary.

Bt2—10 to 19 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; moderate fine prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; slightly alkaline; abrupt smooth boundary.

Bk1—19 to 31 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; weak fine prismatic structure parting to weak fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine accumulations of carbonate; slight effervescence; slightly alkaline; clear smooth boundary.

Bk2—31 to 43 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine prismatic structure parting to weak fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine and medium accumulations of carbonate; about 5 percent fine pebbles; strong effervescence; moderately alkaline; clear smooth boundary.

C—43 to 60 inches; light brownish gray (2.5Y 6/2) loam stratified with gravelly loam and gravelly sand, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable; few fine accumulations of carbonate; about 10 percent gravel, by volume; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 12 to 34 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly loam but silt loam in some pedons

Bt horizon:
Hue—10YR or 2.5Y; value—4 to 6 (2 to 4 moist); and chroma—1 to 4
Texture—silty clay loam or clay loam

Bk horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam, loam, or fine sandy loam

C horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—dominantly stratified sandy loam to clay loam but gravelly sand, sandy material, or clayey material below a depth of 40 inches in some pedons

Sansarc Series

Depth to bedrock: Shallow
Drainage class: Well drained
Permeability: Very slow
Landform: Dissected plains
Parent material: Clayey residuum weathered from shale
Slope: 9 to 40 percent

Typical Pedon

Sansarc clay (fig. 20), in an area of Sansarc-Opal clays, 15 to 40 percent slopes, 1,150 feet south and 2,050 feet west of the northeast corner of sec. 31, T. 109 N., R. 72 W.

A—0 to 4 inches; dark grayish brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; hard, firm, sticky and plastic; slight effervescence; slightly alkaline; clear smooth boundary.

AC—4 to 10 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure parting to weak very fine granular; hard, firm, very sticky and very plastic; about 15 percent shale fragments, by volume; slight effervescence; slightly alkaline; clear smooth boundary.

C—10 to 18 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; about 50 percent shale fragments, by volume; slight effervescence; slightly alkaline; gradual wavy boundary.

Cr—18 to 60 inches; light brownish gray (2.5Y 6/2) shale, dark grayish brown (2.5Y 4/2) moist; slight effervescence; slightly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 4 inches
Depth to contrasting parent material: 10 to 20 inches over shale
Depth to gypsum and other visible salts: More than 4 inches

A horizon:
Hue—10YR, 2.5Y, or 5Y; value—4 to 7 (3 to 5 moist); and chroma—1 to 3
Texture—dominantly clay but silty clay in some pedons

AC horizon:
Hue—10YR, 2.5Y, or 5Y; value—5 to 7 (4 to 6 moist); and chroma—1 or 2
Texture—clay

C horizon:
Hue—10YR, 2.5Y, or 5Y; value—5 to 7 (4 to 6 moist); and chroma—1 to 3
Texture—clay

Cr horizon:
Hue—10YR, 2.5Y, or 5Y; value—4 to 7 (3 to 6 moist); and chroma—1 to 4
Texture—shale

Stickney Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Till plains
Parent material: Loamy glacial till
Slope: 0 to 2 percent

Typical Pedon

Stickney loam, in an area of Glenham-Stickney-Hoven complex, 0 to 4 percent slopes, 900 feet north and 1,050 feet east of the southwest corner of sec. 5, T. 112 N., R. 71 W.

A—0 to 6 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine platy structure parting to moderate fine granular; slightly hard, friable; slightly acid; clear smooth boundary.

E—6 to 11 inches; gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium and fine subangular blocky structure parting to moderate thick platy; slightly hard, friable, sticky and plastic; slightly acid; clear smooth boundary.

BE—11 to 14 inches; gray (10YR 5/1) silty clay loam in the Bt part, very dark gray (10YR 3/1) moist, and light brownish gray (10YR 6/2) in the E part, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; slightly acid; abrupt smooth boundary.

Btn1—14 to 28 inches; gray (10YR 5/1) silty clay, very

dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to strong coarse subangular blocky; extremely hard, very firm, very sticky and very plastic; few shiny films on faces of peds; about 2 percent fine pebbles; neutral; clear smooth boundary.

Btn2—28 to 32 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to strong medium and coarse subangular blocky; extremely hard, very firm, very sticky and very plastic; few shiny films on faces of peds; about 2 percent fine pebbles; strong effervescence; slightly alkaline; clear smooth boundary.

Bkz—32 to 45 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; few fine distinct yellowish brown (10YR 5/4) iron masses; common fine and medium accumulations of carbonate; few fine accumulations of salts; about 2 percent fine pebbles; strong effervescence; strongly alkaline; gradual wavy boundary.

Cz—45 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky and plastic; common medium and fine distinct yellowish brown (10YR 5/4) and (10YR 5/6) iron masses; common fine and medium accumulations of carbonate; few fine accumulations of salts; about 2 percent fine pebbles; strong effervescence; strongly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 20 to 45 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 20 to 30 inches

A horizon:
Hue—10YR; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly loam but silt loam or silty clay loam in some pedons

E horizon:
Hue—10YR; value—5 or 6 (3 or 4 moist); and chroma—1 to 3
Texture—silty clay loam, silt loam, or loam

Btn horizon:
Hue—10YR or 2.5Y; value—3 to 5 (2 to 4 moist); and chroma—1 to 3
Texture—silty clay, clay loam, or silty clay loam

Bkz horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 or 3
Texture—clay loam or silty clay loam

C horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—clay loam or loam

Talmo Series

Depth to bedrock: Very deep
Drainage class: Excessively drained
Permeability: Very rapid
Landform: Moraines and outwash plains
Parent material: Loamy alluvium over gravelly outwash sediments
Slope: 3 to 40 percent

Typical Pedon

Talmo loam, 9 to 25 percent slopes, 940 feet north and 425 feet west of the southeast corner of sec. 2, T. 115 N., R. 73 W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, very friable; about 10 percent gravel, by volume; neutral; clear smooth boundary.

AC—4 to 7 inches; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, friable; about 15 percent gravel, by volume; slight effervescence; neutral; clear smooth boundary.

2C1—7 to 20 inches; pale brown (10YR 6/3) very gravelly sand, brown (10YR 4/3) moist; single grain; loose; coatings of carbonate on undersides of gravel; about 50 percent gravel, by volume; strong effervescence; slightly alkaline; gradual smooth boundary.

2C2—20 to 60 inches; yellowish brown (10YR 5/4) very gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose; coatings of carbonate on undersides of gravel; about 50 percent gravel, by volume; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 12 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: 7 to 14 inches over sand and gravel
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR; value—3 to 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly loam or sandy loam but gravelly loam in some pedons

2C horizon:
Hue—10YR or 2.5Y; value—5 to 7 (4 to 6 moist); and chroma—2 to 4
Texture—very gravelly sand, very gravelly loamy sand, extremely gravelly loamy sand, or extremely gravelly sand

Tetonka Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Till plains
Parent material: Local clayey alluvium
Slope: 0 to 1 percent

Typical Pedon

Tetonka silt loam, 2,150 feet south and 1,050 feet east of the northwest corner of sec. 13, T. 111 N., R. 72 W.

A—0 to 6 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak thin platy structure parting to weak fine granular; slightly hard, very friable; moderately acid; clear smooth boundary.
E—6 to 10 inches; light gray (10YR 7/1) silt loam, dark gray (10YR 4/1) moist; common prominent yellowish brown (10YR 5/4) mottles; weak thin platy structure and weak fine subangular blocky; slightly hard, very friable; moderately acid; abrupt smooth boundary.
Bt1—10 to 15 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; extremely hard, very firm, sticky and plastic; few shiny films on faces of peds; slightly acid; gradual wavy boundary.
Bt2—15 to 40 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak coarse prismatic structure parting to moderate medium angular blocky; extremely hard, very firm, sticky and plastic; few shiny films on faces of peds; slightly alkaline; gradual wavy boundary.
Bk—40 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate fine and medium angular blocky; extremely hard, very firm, sticky and plastic; few fine accumulations of carbonate; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 50 inches
Depth to carbonates: 30 to 60 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 50 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly silt loam but silty clay loam or loam in some pedons

E horizon:
Hue—10YR; value—5 to 7 (3 to 5 moist); and chroma—1 or 2
Texture—silt loam, silty clay loam, or loam

Bt horizon:
Hue—10YR, 2.5Y, or 5Y; value—4 to 6 (2 to 4 moist); and chroma—0 to 2
Texture—silty clay, silty clay loam, clay loam, or clay

Bk horizon:
Hue—2.5Y or 5Y; value—5 to 7 (4 or 5 moist); and chroma—0 to 2
Texture—silty clay loam, clay loam, silty clay, or clay

Walke Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Till plains
Parent material: Silty mantle over glacial till
Slope: 0 to 2 percent

Typical Pedon

Walke silt loam, in an area of DeGrey-Walke silt loams, 100 feet south and 1,240 feet west of the northeast corner of sec. 34, T. 110 N., R. 73 W.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium granular structure; soft, very friable; neutral; abrupt smooth boundary.
A2—4 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak medium granular; soft, very friable; neutral; clear smooth boundary.
B/E—7 to 10 inches; grayish brown (10YR 5/2) silty clay loam in the B part, very dark grayish brown (10YR 3/2) moist, and gray (10YR 6/1) silt loam coatings on faces of peds in the E part, very dark gray (10YR 3/1) moist; weak fine prismatic structure parting to weak

medium and fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; neutral; abrupt smooth boundary.

Btn—10 to 19 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate fine prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few shiny films on faces of peds; neutral; clear smooth boundary.

Bk1—19 to 33 inches; light brownish gray (2.5Y 6/2) silty clay loam, olive brown (2.5Y 4/4) moist; weak fine prismatic structure parting to weak fine subangular blocky; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium accumulations of carbonate; few fine nests of gypsum; strong effervescence; moderately alkaline; gradual smooth boundary.

2Bk2—33 to 47 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; about 2 percent fine pebbles and shale fragments; common medium and coarse accumulations of carbonate; strong effervescence; moderately alkaline; gradual smooth boundary.

2C—47 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; about 5 percent fine pebbles and shale fragments; few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 18 to 24 inches
Depth to carbonates: 12 to 24 inches
Depth to contrasting parent material: 20 to 40 inches over glacial till
Depth to gypsum and other visible salts: 17 to 45 inches

A horizon:
Hue—10YR; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—silt loam

B/E horizon:
Hue—10YR or 2.5Y; value—5 or 6 (3 or 4 moist); and chroma—1 or 2
Texture—silty clay loam

Btn horizon:
Hue—10YR or 2.5Y; value—4 or 5 (3 or 4 moist); and chroma—2 or 3
Texture—silty clay or silty clay loam

Bk horizon:
Hue—10YR or 2.5Y; value—5 or 6 (4 or 5 moist); and chroma—2 to 4
Texture—silty clay loam or silty clay

2Bk horizon:
Hue—10YR, 2.5Y, or 5Y; value—5 to 7 (3 to 6 moist); and chroma—1 to 4
Texture—clay loam or clay

2C horizon:
Hue—10YR, 2.5Y, or 5Y; value—5 to 7 (3 to 6 moist); and chroma—1 to 4
Texture—clay loam or clay

Wendte Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Flood plains
Parent material: Clayey alluvium
Slope: 0 to 1 percent

Typical Pedon

Wendte silty clay, channeled, 1,380 feet north and 665 feet west of the southeast corner of sec. 14, T. 109 N., R. 72 W.

A—0 to 5 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; weak medium and fine granular structure; hard, firm, sticky and plastic; few thin layers (less than 1/8 inch thick) of medium sand; slight effervescence; slightly alkaline; gradual smooth boundary.

C1—5 to 11 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; weak coarse subangular blocky and weak fine granular structure; hard, firm, sticky and plastic; few thin layers (less than 1/8 inch thick) of shale fragments; slight effervescence; slightly alkaline; clear smooth boundary.

C2—11 to 15 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; massive; very hard, firm, sticky and plastic; strong effervescence; clear smooth boundary.

Cz1—15 to 34 inches; dark gray (10YR 4/1) stratified clay and clay loam, very dark gray (10YR 3/1) moist; massive; very hard, firm, sticky and plastic; few fine nests of gypsum crystals; about 2 percent fine fragments of shale; strong effervescence; slightly alkaline; clear smooth boundary.

Cz2—34 to 60 inches; grayish brown (2.5Y 5/2) clay loam,

dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and plastic; common fine and medium distinct dark yellowish brown (10YR 4/6) moist iron masses; few fine and medium nests of gypsum crystals; about 10 percent fragments of shale; strong effervescence; slightly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 12 inches

A horizon:
Hue—10YR, 2.5Y, or 5Y; value—4 or 5 (2 or 3 moist); and chroma—1 or 2
Texture—dominantly silty clay but clay, silty clay loam, or clay loam in some pedons

C horizon:
Hue—10YR, 2.5Y, or 5Y; value—4 to 7 (3 to 6 moist); and chroma—1 to 4
Texture—stratified silty clay loam to clay

Formation of the Soils

Soil forms when chemical and physical processes act on geologically deposited or accumulated material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material, the climate under which the soil material has accumulated and existed since accumulation, the plant and animal life on and in the soil, the relief, and the length of time that the forces of soil formation have acted on the soil material.

Climate and plant and animal life are active factors of soil formation. They act on the parent material and slowly change it to a natural body that has genetically related horizons. The effects of climate and plant and animal life are modified by relief. The parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for changing the parent material into a soil having genetically related horizons. Usually, a long time is required for development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four. The following paragraphs relate the factors of soil formation to the soils in Hyde County.

Climate

Climate directly influences the rate of chemical and physical weathering. Hyde County has a continental climate that is characterized by cold winters and hot summers. This type of climate favors the growth of grasses and the resulting accumulation of organic matter in the upper part of the soil. The climate generally is uniform throughout the county, and thus it is not a factor in differentiating the soils within the county. Additional climatic data are provided under the heading "General Nature of the County."

Plant and Animal Life

Plants, animals, insects, earthworms, bacteria, actinomycetes, and fungi have important effects on soil formation. They increase the content of organic matter and plant nutrients and change soil structure and porosity. In Hyde County, the prairie grasses have influenced soil formation more than the other living organisms. Because of the grasses, the surface layer of many soils, such as Onita and Prosper soils, has a moderate or high content of organic matter.

Earthworms, insects, and burrowing animals help to maintain the porous nature of the soils. Bacteria and fungi decompose plant residue, thus releasing plant nutrients.

Parent Material

Parent material is the unconsolidated organic and mineral material in which soils form. It determines many of the chemical and physical characteristics of the soils, such as color, texture, reaction, and consistence. The rate of soil formation is more rapid in friable, loamy and silty parent material than in other kinds of parent material. More changes occur in soils that formed in these materials, and the horizons are more distinct than in other types of soils.

Most of the soils in the northern three-fourths of Hyde County formed in glacial material that was derived from preglacial formations of granite, gneiss, limestone, sandstone, and shale. The glacier ground and mixed these materials as it transported them. It then deposited them as it melted. Some deposits consist of unsorted material, or glacial till; others consist of material that was sorted either by water during deposition or by wind and water after deposition. The soils in the southern one-fourth of the county formed from the underlying geologic formations.

Lacustrine deposits consist of material that was deposited in lake water and became exposed when the water level lowered. Bend and Edwin soils are examples of soils that formed in silty lacustrine material.

Silty glacial till consists of material that was deposited on glacial ice and was reworked by water as the glacier melted. Highmore soils formed in silty glacial till. Eakin soils formed in a thin mantle of silty glacial till over loamy glacial till.

Glacial till is a mixture of clay, silt, and sand, and gravel that contains few to many cobblestones and boulders. The content of pebbles and cobblestones is higher than that of silty glacial till. The proportion of each kind of material is determined by the kind of material that was transported by

the glacier. Examples of soils that formed in loamy glacial till are Glenham, Java, Peno, and Raber soils.

Glacial outwash consists of sandy, gravelly, and loamy material that was deposited by glacial meltwater. Delmont, Oahe, and Talmo soils formed in loamy glacial outwash that was underlain by sand and gravel within a depth of 40 inches.

Onita, Plankinton, Prosper, and Tetonka soils are examples of soils that formed partially or entirely in local alluvium washed from adjacent, sloping soils on uplands. Bon and Egas are examples of soils that formed in alluvium deposited by streams.

The bedrock in Hyde County is mainly marine shale of the Pierre Formation. It was deposited during the Late Cretaceous Period. Opal and Sansarc soils are examples of soils that formed in material weathered from the Pierre Formation.

Relief

Relief affects soil formation through its affect on drainage, runoff, erosion, plant cover, and soil temperature. In the more sloping areas of Betts soils, much of the rainfall is lost through excessive runoff. As a result, a limited amount of moisture penetrates the surface and much of the soil material is lost through erosion. These soils are calcareous at or near the surface. The layers in which organic matter accumulates are thin.

Runoff is slower in the less sloping areas of Glenham and Highmore soils than on Betts soils. As a result, more moisture penetrates the surface, the layers in which organic matter accumulates are thicker, and calcium carbonate is leached to a greater depth.

Onita and Prosper soils are on foot slopes that receive extra moisture in the form of runoff from adjacent soils. The layers in which organic matter accumulates are thicker than those of the Glenham and Highmore soils. Also, calcium carbonate is leached to a greater depth. In areas of Lawet soils, where drainage is impeded, the fluctuating water table favors the concentration of calcium carbonate and other soluble salts. Hoven, Kolls, and Macken soils are in basins where water ponds. They have colors characteristic of poorly drained soils.

Time

The length of time that soil material has been exposed to the other four factors of soil formation is reflected in the kinds of soil that have formed. The degree of profile development reflects the age of a soil. The oldest soils are on parts of the landscape that have been stable for the longest time. In Hyde County, these soils include Eakin, Glenham, and Highmore soils. The youngest soils are those in which natural erosion removes nearly as much soil material as is formed through the weathering of parent material or are alluvial soils, which receive new material each time the area is flooded. Betts and Sansarc soils are examples of young soils that are subject to natural erosion. Bon and Wendte soils are examples of young alluvial soils.

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Glossary

Actinomycetes. A group of organisms intermediate between the bacteria and the true fungi.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of alluvial clay.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Back slope. Geomorphic component that forms the steepest inclined surface and principal element of many hill slopes. Back slopes are commonly steep and linear and descend to a foot slope. Back slopes are erosional forms produced mainly by mass wasting and running water.

Basin. A depressed area with no surface outlet. Examples are closed depressions in a glacial till plain or lake basin.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeter) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean tilled crops or summer fallow.

Contour farming. Growing crops in strips that follow the contour.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. The thickness of weathered soil material over bedrock. The depth classes recognized in this survey, in inches, are—

Very deep	more than 60
Deep	40 to 60
Moderately deep	20 to 40
Shallow	less than 20

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan. A relict alluvial fan, no longer a site of active deposition.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, form the unconsolidated parent material.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated (varves).

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft (can be dug with a spade), consolidated bedrock beneath the soil.

R layer.—Hard (can not be dug with a spade), consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Landform. Any physical, recognizable form or feature of the earth's surface, having a characteristic shape, and produced by natural causes.

Landscape. All the natural features, such as field, hills, forests, and water, that distinguish one part of the earth's surface.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Mesophtic crop. Any crop adapted to grow under medium conditions of moisture.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Mollic epipedon. A thick dark humus rich surface horizon or (horizons) that have high base saturation and pedogenic soil structure. It may include part of the subsoil.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notion of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Native grass. A species of grass native to the region in which it is found.

Natric soil. A special kind of argillic horizon that contains enough exchangeable sodium to adversely affect the physical condition of the subsoil.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial meltwater.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Pasture, tame. Grazing land planted to primarily introduced or domesticated native forage species, that receive periodic renovation and cultural treatment such as tillage or both.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0 2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 incnes
Very rapid	more than 20 ınches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plain. Area that ranges from level to gently sloping or undulating. A plain has few or no prominent hills or valleys.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Potential native vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, many wetlands, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are—

Ultra acid	less than 3 5
Extremely acid	3.5 to 4 5
Very strongly acid	4.5 to 5.0
Strongly acıd	5.1 to 5.5
Moderately acıd	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7 3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaıine	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral

fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shoulder. Forms the uppermost inclined surfaced at the top of a hill slope. Transition zone from back slope to summit of an upland. Dominantly convex in profile and erosional in origin.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the county.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slickspot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. The slope classes recognized in this survey area are as follows:

Level	0 to 1 percent
Nearly level or gently undulating	0 to 2 or 3 percent
Gently sloping or undulating	2 or 3 to 6 percent
Moderately sloping or gently rolling	6 to 9 percent
Strongly sloping or rolling	9 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 40 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in table). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common is semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. Top or highest level of an upland feature. A high interfluve area of gentler slope that is flanked by steeper hill slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, and manganese and copper are in soils in extremely small amounts. They are essential to plant growth.

Transitional layer. A layer of soil that grades to the next layer or includes parts of adjacent layers, commonly between the surface layer and subsoil or underlying layer.

Underlying layer. The C or R horizon; the part of the soil below the subsoil, commonly the parent material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in glacial lake or other body of still water in front of a glacier.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-87 at Highmore, South Dakota)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	24.8	2.3	13.6	54	-31	16	.34	.08	.53	1	5.0
February----	31.6	9.5	20.6	61	-25	32	.57	.12	.92	2	6.7
March-------	41.4	19.0	30.2	73	-13	77	1.14	.25	1.78	3	8.3
April-------	59.4	32.7	46.1	89	9	230	2.05	.56	3.21	5	3.5
May---------	71.5	43.6	57.6	94	23	546	2.72	1.17	3.98	6	.1
June--------	80.8	53.4	67.1	101	35	813	3.33	1.78	4.65	7	.0
July--------	88.7	59.5	74.1	107	42	1,057	2.87	1.22	4.04	6	.0
August------	87.5	57.6	72.6	106	40	1,011	2.44	.96	3.60	5	.0
September---	76.5	46.7	61.6	101	24	648	1.48	.27	2.39	4	.0
October-----	63.5	35.6	49.6	90	13	314	1.35	.33	2.10	3	1.2
November----	44.0	21.3	32.7	72	-6	37	.58	.09	.86	2	4.4
December----	29.9	9.0	19.5	60	-25	27	.40	.13	.61	2	5.4
Yearly:											
Average---	58.3	32.5	45.4	---	---	---	---	---	---	---	---
Extreme---	---	---	---	109	-31	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,808	19.27	15.00	23.02	46	34.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-87 at Highmore, South Dakota)

Probability	Temperature 24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 1	May 16	May 30
2 years in 10 later than--	Apr. 28	May 12	May 26
5 years in 10 later than--	Apr. 21	May 5	May 18
First freezing temperature in fall:			
1 year in 10 earlier than--	Sep. 17	Sep. 18	Sep. 15
2 years in 10 earlier than--	Sep. 24	Sep. 24	Sep. 19
5 years in 10 earlier than--	Oct. 9	Oct. 4	Sep. 27

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-87 at Highmore, South Dakota)

Probability	Daily minimum temperature during growing season: Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	140	130	115
8 years in 10	151	137	121
5 years in 10	170	151	131
2 years in 10	189	164	142
1 year in 10	200	171	147

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
BdA	Bend-Edwin complex, 0 to 4 percent slopes	834	0.2
BkE	Betts-Java loams, 9 to 20 percent slopes	1,017	0.2
BkF	Betts-Java loams, 20 to 40 percent slopes	905	0.2
Bn	Bon loam, channeled	606	0.1
BuA	Bullcreek clay, 0 to 6 percent slopes	882	0.2
CcA	Capa Carter silt loams, 0 to 4 percent slopes	5,007	0.9
ClA	Capa-Slickspots complex, 0 to 4 percent slopes	2,140	0.4
CpA	Carter-Promise complex, 0 to 3 percent slopes	3,312	0.6
CrA	Cavo-Jerauld loams, 0 to 4 percent slopes	4,432	0.8
Cs	Cavo-Stickney loams	9,636	1.7
Df	DeGrey-Walke silt loams	12,918	2.3
DnB	Delmont-Oahe loams, 2 to 6 percent slopes	5,787	1.0
Du	Durrstein-Egas complex	4,285	0.8
EpC	Eakin-Peno complex, 6 to 9 percent slopes	9,478	1.7
ErA	Eakin-Raber complex, 0 to 2 percent slopes	5,055	0.9
ErB	Eakin-Raber complex, 2 to 6 percent slopes	30,919	5.6
GfF	Gettys-Sansarc complex, 9 to 40 percent slopes	3,022	0.6
GmB	Glenham-Java loams, 2 to 6 percent slopes	39,929	7.2
GnA	Glenham-Java-Cavo loams, 0 to 4 percent slopes	26,687	4.8
GrA	Glenham-Prosper loams, 0 to 2 percent slopes	11,450	2.1
GrB	Glenham-Prosper loams, 2 to 6 percent slopes	3,858	0.7
GsA	Glenham-Prosper-Hoven complex, 0 to 4 percent slopes	31,044	5.6
GtB	Glenham-Prosper-Java loams, 1 to 6 percent slopes	27,313	4.9
GuA	Glenham-Stickney-Hoven complex, 0 to 4 percent slopes	7,251	1.3
HaA	Henkin-Blendon fine sandy loams, 0 to 4 percent slopes	521	0.1
HdA	Highmore-DeGrey silt loams, 0 to 2 percent slopes	22,019	4.0
HdB	Highmore-DeGrey silt loams, 2 to 6 percent slopes	6,683	1.2
HeA	Highmore-Eakin silt loams, 0 to 2 percent slopes	10,245	1.8
HeB	Highmore-Eakin silt loams, 2 to 6 percent slopes	5,706	1.0
Ho	Hoven silt loam	12,933	2.3
HuB	Hurley silt loam, 0 to 6 percent slopes	35	*
JaC	Java, stony-Glenham-Prosper loams, 1 to 9 percent slopes	2,663	0.5
JbD	Java-Betts loams, 6 to 15 percent slopes	6,713	1.2
JcD	Java-Betts, stony, loams, 6 to 25 percent slopes	2,206	0.4
JgB	Java-Glenham loams, 2 to 6 percent slopes	32,234	5.8
JgC	Java-Glenham loams, 6 to 9 percent slopes	9,815	1.8
JhC	Java-Glenham-Prosper loams, 1 to 9 percent slopes	8,427	1.5
JsA	Jerauld-Slickspots complex, 0 to 4 percent slopes	86	*
Ko	Kolls clay	404	0.1
Lc	Lawet loam	353	0.1
Ma	Macken silty clay loam	3,570	0.6
Mb	Macken silty clay loam, ponded	3,030	0.6
OaA	Oahe loam, 0 to 2 percent slopes	1,086	0.2
OdA	Oahe-Delmont loams, 0 to 2 percent slopes	1,204	0.2
OkB	Oko clay loam, 2 to 6 percent slopes	4,145	0.7
OkC	Oko clay loam, 6 to 9 percent slopes	2,886	0.5
OkD	Oko clay loam, 9 to 20 percent slopes	1,907	0.3
OnA	Onita silt loam, 0 to 2 percent slopes	2,657	0.5
Os	Onita-Hoven silt loams	6,875	1.2
OtB	Opal clay, 2 to 6 percent slopes	5,461	1.0
OtC	Opal clay, 6 to 9 percent slopes	5,754	1.0
OuD	Opal-Sansarc clays, 9 to 20 percent slopes	7,687	1.4
Ow	Orthents, gravelly	194	*
OxD	Orton-Talmo loams, 9 to 25 percent slopes	806	0.1
PgD	Peno-Gettys complex, 9 to 25 percent slopes	5,118	0.9
Pk	Plankinton silt loam	7,324	1.3
PrA	Promise silty clay, 0 to 2 percent slopes	5,249	0.9
PrB	Promise silty clay, 2 to 6 percent slopes	7,559	1.4
Ps	Prosper loam	1,213	0.2
RaA	Raber loam, 0 to 2 percent slopes	1,363	0.2
RaB	Raber loam, 2 to 6 percent slopes	1,561	0.3
RcA	Raber-Cavo loams, 0 to 2 percent slopes	6,648	1.2
RcB	Raber-Cavo loams, 2 to 6 percent slopes	14,205	2.6

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
RpB	Raber-Peno loams, 2 to 6 percent slopes	5,952	1.1
RpC	Raber-Peno loams, 6 to 9 percent slopes	10,349	1.9
RrA	Ree loam, 0 to 2 percent slopes	121	*
RsF	Rock outcrop-Sansarc complex, 15 to 40 percent slopes	2,473	0.4
SbF	Sansarc-Opal clays, 15 to 40 percent slopes	10,370	1.9
StA	Stickney-Java loams, 0 to 4 percent slopes	9,392	1.7
SvA	Stickney-Java-Hoven complex, 0 to 4 percent slopes	37,306	6.7
TaE	Talmo loam, 9 to 25 percent slopes	963	0.2
TbA	Talmo sandy loam, 0 to 3 percent slopes	113	*
TcF	Talmo, stony-Java loams, 9 to 40 percent slopes	452	0.1
TdD	Talmo-Delmont loams, 3 to 15 percent slopes	4,174	0.8
Te	Tetonka silt loam	1,864	0.3
Wd	Wendte silty clay, channeled	1,536	0.3
	Water	3,765	0.7
	Total	555,142	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
BdA	Bend-Edwin complex, 0 to 4 percent slopes (where irrigated)
ErA	Eakin-Raber complex, 0 to 2 percent slopes (where irrigated)
ErB	Eakin-Raber complex, 2 to 6 percent slopes (where irrigated)
GrA	Glenham-Prosper loams, 0 to 2 percent slopes (where irrigated)
GrB	Glenham-Prosper loams, 2 to 6 percent slopes (where irrigated)
HaA	Henkin-Blendon fine sandy loams, 0 to 4 percent slopes (where irrigated)
HeA	Highmore-Eakin silt loams, 0 to 2 percent slopes (where irrigated)
HeB	Highmore-Eakin silt loams, 2 to 6 percent slopes (where irrigated)
OaA	Oahe loam, 0 to 2 percent slopes (where irrigated)
OnA	Onita silt loam, 0 to 2 percent slopes
Ps	Prosper loam
RaA	Raber loam, 0 to 2 percent slopes (where irrigated)
RaB	Raber loam, 2 to 6 percent slopes (where irrigated)
RrA	Ree loam, 0 to 2 percent slopes (where irrigated)

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Corn	Oats	Wheat, spring	Wheat, winter	Alfalfa-hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Tons	AUM
BdA: Bend-Edwin	30	44	23	32	2.0	3.3
BkE: Betts-Java	---	---	---	---	---	---
BkF: Betts-Java	---	---	---	---	---	---
Bn: Bon	---	---	---	---	---	---
BuA: Bullcreek	---	---	---	---	---	---
CcA: Capa-Carter	---	---	---	---	---	---
ClA*: Capa-Slickspots	---	---	---	---	---	---
CpA: Carter-Promise	24	39	22	32	1.4	2.3
CrA: Cavo-Jerauld	13	24	12	15	0.9	1.4
Cs: Cavo-Stickney	25	40	22	27	1.6	2.6
Df: Degrey-Walke	25	37	20	26	1.3	2.1
DnB: Delmont-Oahe	26	32	12	17	1.1	1.8
Du: Durrstein-Egas	---	---	---	---	---	---
EpC: Eakin-Peno	33	44	21	29	1.8	3.0
ErA: Eakin-Raber	43	56	25	35	2.2	3.7
ErB: Eakin-Raber	40	54	24	33	2.1	3.5
GfF: Gettys-Sansarc	---	---	---	---	---	---
GmB: Glenham-Java	32	49	22	31	1.9	3.2
GnA: Glenham-Java-Cavo	30	45	23	30	1.8	3.0

See footnote at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Wheat, spring	Wheat, winter	Alfalfa-hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Tons	AUM
GrA: Glenham-Prosper	47	61	30	39	2.5	4.2
GrB: Glenham-Prosper	44	58	27	36	2.3	3.8
GsA: Glenham-Prosper-Hoven	35	48	23	32	1.8	3.0
GtB: Glenham-Prosper-Java	40	54	25	32	2.2	3.7
GuA: Glenham-Stickney-Hoven	30	43	21	28	1.6	2.7
HaA: Henkin-Blendon	34	44	21	27	1.7	2.8
HdA: Highmore-Degrey	31	47	22	30	1.8	3.0
HdB: Highmore-Degrey	30	45	21	28	1.7	2.8
HeA: Highmore-Eakin	44	59	26	35	2.3	3.8
HeB: Highmore-Eakin	42	56	24	34	2.2	3.7
Ho: Hoven	---	---	---	---	---	---
HuB: Hurley	---	---	---	---	---	---
JaC: Java-Glenham-Prosper	---	---	---	---	---	---
JbD, JcD: Java-Betts	---	---	---	---	---	---
JgB: Java-Glenham	30	45	23	30	1.8	3.0
JgC: Java-Glenham	25	40	19	25	1.7	2.8
JhC: Java-Glenham-Prosper	31	44	22	28	1.9	3.2
JsA*: Jerauld-Slickspots	---	---	---	---	---	---
Ko: Kolls	---	---	---	---	---	---
Lc: Lawet	20	28	14	17	1.5	2.4

See footnote at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Wheat, spring	Wheat, winter	Alfalfa-hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Tons	AMU
Ma, Mb: Macken	---	---	---	---	---	---
OaA: Oahe	30	42	21	25	1.2	2.0
OdA: Oahe-Delmont	29	39	15	23	1.1	1.8
OkB: Oko	23	44	19	29	1.5	2.7
OkC: Oko	20	40	17	26	1.4	2.3
OkD: Oko	---	---	---	---	---	---
OnA: Onita	60	66	24	41	2.8	4.7
Os: Onita-Hoven	33	40	20	25	1.5	2.5
OtB: Opal	23	39	21	31	1.4	2.3
OtC: Opal	20	33	17	26	1.3	2.1
OuD: Opal-Sansarc	---	---		---	---	---
Ow: Orthents, gravelly	---	---	---	---	---	---
OxD: Orton-Talmo	---	---	---	---	---	---
PgD: Peno-Gettys	---	---	---	---	---	---
Pk: Plankinton	20	20	15	18	0.3	0.5
PrA: Promise	30	48	24	38	1.7	2.8
PrB: Promise	28	46	23	36	1.6	2.6
Ps: Prosper	60	68	36	43	3.0	5.0
RaA: Raber	36	54	24	32	2.1	3.5
RaB: Raber	34	52	23	31	2.0	3.3

See footnote at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Wheat, spring	Wheat, winter	Alfalfa-hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Tons	AMU
RcA: Raber-Cavo	27	45	21	28	1.7	2.8
RcB: Raber-Cavo	26	44	21	27	1.6	2.7
RpB: Raber-Peno	31	47	22	29	1.9	3.2
RpC: Raber-Peno	28	41	20	26	1.7	2.8
RrA: Ree	41	57	26	35	2.0	3.3
RsF: Rock outcrop-Sansarc	---	---	---	---	---	---
SbF: Sansarc-Opal	---	---	---	---	---	---
StA: Stickney-Java	32	46	25	32	1.9	3.2
SvA: Stickney-Java-Hoven	24	35	19	26	1.5	2.4
TaE, TbA: Talmo	---	---	---	---	---	---
TcF: Talmo-Java	---	---	---	---	---	---
TdD: Talmo-Delmont	---	---	---	---	---	---
Te: Tetonka	20	18	12	15	0.2	0.5
Wd: Wendte	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RANGELAND CHARACTERISTIC VEGETATION AND PRODUCTIVITY

Range site, soil name, and map symbols	Potential natural plant community: Common plant name	Composition	Potential annual production for kind of growing season: Favorable	Average	Unfavorable
		Pct	Lb/acre	Lb/acre	Lb/acre
Clayey	Western wheatgrass	35	3,100	2,600	1,800
Oko: OkB, OkC, OkD	Green needlegrass	30			
Opal: OtB, OtC, OuD, SbF	Little bluestem	10			
Peno: EpC, PgD, RpB, RpC	Big bluestem	5			
Promise: CpA, PrA, PrB	Sideoats grama	5			
Raber: ErA, ErB, RaA,	Blue grama	5			
RaB, RcA, RcB, RpB, RpC	Buffalograss	5			
Stickney: Cs, GuA, StA,	Climax forbs	5			
Sva					
Walke: Df					
Clayey Overflow	Big bluestem	55	4,600	3,800	2,700
Wendte: Wd	Green needlegrass	10			
	Western wheatgrass	10			
	Indiangrass	5			
	Little bluestem	5			
	Switchgrass	5			
	Sideoats grama	5			
	Sedges	3			
	Climax shrubs	2			
Claypan	Western wheatgrass	45	2,400	2,000	1,400
Carter: CcA, CpA	Green needlegrass	15			
Cavo: CrA, Cs, GnA, RcA,	Blue grama	15			
RcB	Needleandthread	5			
DeGrey: Df, HdA, HdB	Buffalograss	5			
	Sideoats grama	5			
	Sedges	5			
	Climax forbs	5			
Closed Depression	Western wheatgrass	85	3,900	3,500	2,400
Hoven: GsA, GuA, Ho, Os,	Sedges	10			
SvA	Climax forbs	5			
Kolls: Ko					
Macken: Ma					
Plankinton: Pk					
Dense Clay	Western wheatgrass	65	2,300	1,800	1,100
Bullcreek: BuA	Green needlegrass	25			
	Climax forbs	10			
Loamy Overflow	Big bluestem	55	4,600	3,800	2,700
Bon: Bn	Green needlegrass	10			
Onita: Os	Switchgrass	10			
Prosper: GrA, GsA, Ps	Western wheatgrass	5			
	Indiangrass	5			
	Little bluestem	5			
	Sideoats grama	5			
	Sedges	3			
	Climax shrubs	2			
Saline Lowland	Prairie cordgrass	35	4,100	3,700	2,900
Durrstein: Du	Western wheatgrass	25			
Egas: Du	Nuttall alkaligrass	10			
	Saltgrass	10			
	Alkali sacaton	5			
	Switchgrass	5			
	Sedges	5			
	Climax forbs	5			

TABLE 7.--RANGELAND CHARACTERISTIC VEGETATION AND PRODUCTIVITY--Continued

Range site, soil name, and map symbols	Potential natural plant community: Common plant name	Composition	Potential annual production for kind of growing season: Favorable	Average	Unfavorable
		Pct	Lb/acre	Lb/acre	Lb/acre
Sandy	Prairie sandreed	20	3,400	2,800	2,000
Blendon: HaA	Little bluestem	20			
Henkin: HaA	Big bluestem or sand bluestem	20			
Orton: OxD	Needleandthread	15			
	Western wheatgrass	5			
	Sideoats grama	5			
	Blue grama	5			
	Sedges	5			
	Climax forbs	5			
Shallow Clay	Little bluestem	30	2,500	2,100	1,500
Sansarc: GfF, OuD, RsF, SbF	Big bluestem	15			
	Green needlegrass	15			
	Western wheatgrass	15			
	Sideoats grama	5			
	Blue grama	5			
	Sedges	5			
	Climax forbs	5			
	Climax shrubs	5			
Shallow to Gravel	Needleandthread	40	2,300	1,900	1,100
Delmont: DnB, OdA, TdD	Blue grama and hairygrama	20			
	Western wheatgrass	10			
	Little bluestem	5			
	Plains muhly	5			
	Threadleaf sedge	5			
	Prairie dropseed	5			
	Sideoats grama	5			
	Climax forbs	3			
	Climax shrubs	2			
Silty	Green needlegrass	30	3,400	2,800	2,000
Bend: BdA	Western wheatgrass	15			
Eakin: EpC, ErA, ErB, HeA, HeB	Big bluestem	15			
Glenham: GmB, GnA, GrA, GsA, GtB, GuA, JaC, JgB, JgC, JhC	Porcupine grass	5			
Highmore: HdA, HdB, HeA, HeB	Little bluestem	5			
Java: BkE, BkF, GmB, GnA, GtB, JaC, JbD, JcD, JgB, JgC, JhC, StA, SvA, TcF	Needleandthread	5			
Oahe: DnB, OaA, OdA	Prairie dropseed	5			
Onita: OnA	Sideoats grama	5			
Prosper: GrB, GtB, JaC, JhC	Blue grama	5			
Ree: RrA	Climax forbs	5			
	Climax shrubs	5			
Subirrigated	Big bluestem	60	5,600	5,100	4,100
Lawet: Lc	Switchgrass	10			
	Indiangrass	5			
	Little bluestem	5			
	Western wheatgrass	5			
	Bluegrasses	5			
	Sedges	5			
	Climax forbs	5			

TABLE 7.--RANGELAND CHARACTERISTIC VEGETATION AND PRODUCTIVITY--Continued

Range site, soil name, and map symbols	Potential natural plant community		Potential annual production for kind of growing season		
	Common plant name	Composition	Favorable	Average	Unfavorable
		Pct	Lb/acre	Lb/acre	Lb/acre
Thin Claypan	Western wheatgrass	45	1,800	1,500	900
Capa: CcA, ClA	Blue grama	30			
Hurley: HuB	Buffalograss	10			
Jerauld: CrA, JsA	Inland saltgrass	5			
	Sedges	5			
	Climax forbs	5			
Thin Upland	Little bluestem	40	2,900	2,400	1,700
Betts: BkE, BkF, JbD, JcD	Needleandthread	10			
Edwin: BdA	Sideoats grama	10			
Gettys: GfF, PgD	Blue grama	10			
	Green needlegrass	5			
	Big bluestem	5			
	Plains muhly	5			
	Western wheatgrass	5			
	Climax forbs	5			
	Climax shrubs	5			
Very Shallow	Needleandthread	30	1,700	1,400	800
Talmo: OxD, TaE, TbA, TcF, TdD	Blue grama and hairy grama	30			
	Sedges	20			
	Climax forbs	10			
	Climax shrubs	10			
Wet Meadow	Sedges	50	4,400	4,000	2,800
Tetonka: Te	Reedgrasses	20			
	Prairie cordgrass	15			
	Western wheatgrass	5			
	Fowl bluegrass	5			
	Rushes	5			

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Dashes indicate that trees generally do not grow to the given height on the soils in that group)

Windbreak suitability group, soil name, and map symbols	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Group 1 Bon: Bn Onita: OnA, Os Prosper: GrA, GrB, GsA, GtB, JaC, JhC, Ps	Amur honeysuckle, common lilac, golden current, Hansen hedgerose, juneberry, late lilac, Mongolian cherry, Nanking cherry, Peking cotoneaster, redosier dogwood, skunkbush sumac, western sandcherry.	Arnold hawthorn, American plum, Amur maple, caragana, common chokecherry, eastern redcedar, European cotoneaster, Manchurian apricot, Sargent crabapple, Siberian apricot, silver buffaloberry, Rocky Mountain juniper, Ussurian pear.	Austrian pine, Black Hills spruce, black walnut, blue spruce, bur oak, European birdcherry, green ash, hackberry, Manchurian crabapple, Ponderosa pine, Russian-olive, Scotch pine, Siberian crabapple, white poplar, white spruce.	European larch, golden willow, Siberian elm, Siberian larch, white willow.	Carolina poplar, eastern cottonwood, northwest poplar, plains cottonwood, robusta poplar.
Group 2 Lawet: Lc	American plum, Amur honeysuckle, common lilac, golden currant, Hansen hedgerose, juneberry, late lilac, Mongolian cherry, Nanking cherry, Peking cotoneaster, redosier dogwood, silver buffaloberry, skunkbush sumac, western sandcherry.	Amur maple, Arnold hawthorn, caragana, common chokecherry, European cotoneaster, Manchurian apricot, Siberian apricot, Ussurian pear.	Austrian pine, Black Hills spruce, blue spruce, boxelder, bur oak, eastern redcedar, European birdcherry, European larch, green ash, hackberry, Manchurian crabapple, Ponderosa pine, Rocky Mountain juniper, Russian olive, Scotch pine, Siberian crabapple, Siberian larch, white spruce.	Carolina poplar, golden willow, white willow.	Eastern cottonwood, northwest poplar, plains cottonwood, robusta poplar.
Group 3 Bend: BdA Eakin: EpC, ErA, ErB, HeA, HeB Glenham: GmB, GnA, GrA, GrB, GsA, GtB, GuA, JaC, JgB, JgC, JhC Highmore: HdA, HdB, HeA, HeB Ree: RrA	Common lilac, golden current, Hansen hedgerose, late lilac, Mongolian cherry, Nanking cherry, Peking cotoneaster, redosier dogwood, skunkbush sumac, western sandcherry.	American plum, Amur honeysuckle, Amur maple, Arnold hawthorn, caragana, common chokecherry, eastern redcedar, European cotoneaster, Manchurian apricot, Manchurian crabapple, Rocky Mountain juniper, Siberian apricot, Siberian crabapple, silver buffaloberry, Ussurian pear.	Austrian pine, Black Hills spruce, blue spruce, boxelder, bur oak, European birdcherry, green ash, hackberry, Ponderosa pine, Russian olive, Scotch pine, Siberian larch, white poplar, white spruce.	Siberian elm	---

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Windbreak suitability group, soil name, and map symbols	Trees having predicted 20-year average height, in feet, of <8	8-15	16-25	26-35	>35
Group 4: Oko: OkB, OkC; Opal: OtB, OtC; Peno: EpC, RpB, RpC; Promise: CpA, PrA, PrB; Raber: ErA, ErB, RaA, RaB, RcA, RcB, RpB, RpC; Stickney: Cs, GuA, StA, SvA; Walke: Df; Wendte: Wd	American plum, Amur honeysuckle, caragana, common lilac, European cotoneaster, golden current, Nanking cherry, Peking cotoneaster, Russian almond, silver buffaloberry, skunkbush sumac.	Arnold hawthorne, bur oak, common chokecherry, eastern redcedar, European birdcherry, Manchurian apricot, Manchurian crabapple, Rocky Mountain juniper, Russian olive, Siberian apricot, Siberian crabapple, Ussurian pear.	Green ash, hackberry, ponderosa pine, white poplar.	Siberian elm	---
Group 5: Blendon: HaA; Henkin: HaA	American plum, Amur honeysuckle, common lilac, European cotoneaster, golden current, Nanking cherry, Peking cotoneaster, silver buffaloberry, skunkbush sumac, western sandcherry.	Caragana, common chokecherry, eastern redcedar, Manchurian apricot, Manchurian crabapple, Rocky Mountain juniper, Siberian apricot, Siberian crabapple, Ussurian pear.	Bur oak, green ash, hackberry, ponderosa pine, Russian olive, white poplar.	Siberian elm	---
Group 6: Delmont: DnB, OdA; Oahe: DnB, DaA, DdA	Caragana, common lilac, Peking cotoneaster, silver buffaloberry, Russian almond.	Eastern redcedar, hackberry, Manchurian crabapple, Rocky Mountain juniper, Russian olive, Siberian crabapple, Ussurian pear, white poplar.	Green ash, ponderosa pine.	Siberian elm	---
Group 7: Bankard: Bc	None	None	None	None	None.
Group 8: Edwin: BdA; Betts: JbD; Java: GmB, GnA, GtB, JbD, JgB, JgC, JhC, StA, SvA	American plum, caragana, common lilac, golden current, Peking cotoneaster, silver buffaloberry, Russian almond.	Eastern redcedar, hackberry, ponderosa pine, Rocky Mountain juniper, Russian olive, Ussurian pear, white poplar.	Green ash, Siberian elm.	---	---
Group 9: Carter: CcA, CpA; Cavo: CrA, Cs, GnA, RcA, RcB; DeGrey: Df, HdA, HdB	Caragana, common lilac, Eastern redcedar, Rocky Mountain juniper, Russian almond, silver buffaloberry, Ussurian pear.	Green ash, ponderosa pine, Russian olive, Siberian elm.	---	---	---

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Windbreak suitability group, soil name, and map symbols	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Group 10 Betts: BkE, BkF, JcD Bullcreek: BuA Capa: CcA, ClA Delmont: TdD Durrstein: Du Egas: Du Hoven: GsA, GuA, Ho, Os, SvA Hurley: HuB Java: BkE, BkF, JaC, JcD, TcF Jerauld: CrA, JsA Kolls: Ko Macken: Ma, Mb Oko: OkD Opal: OuD, SbF Orthents: Ow Orton: OxD Peno: PgD Plankinton: Pk Sansarc: GfF, OuD, RsF, SbF Slickspots: ClA, JsA Rock outcrop: RsF Talmo: OxD, TaE, TbA, TcF, TdD Tetonka: Te	None	None	None	None	None.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
BdA*:				
Bend	Slight	Slight	Moderate: slope.	Slight.
Edwin	Slight	Slight	Moderate: slope.	Slight.
BkE*:				
Betts	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Java	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
BkF*:				
Betts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Java	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bn Bon	Severe: flooding.	Slight	Moderate: flooding.	Slight.
BuA Bullcreek	Severe: flooding.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey, percs slowly.	Severe: erodes easily.
CcA*:				
Capa	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Carter	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
ClA*:				
Capa	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Slickspots	Severe: percs slowly, excess salt.	Severe: excess salt, percs slowly.	Severe: percs slowly, excess salt.	Severe: too clayey.
CpA*:				
Carter	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight.
Promise	Moderate: percs slowly.	Moderate: too clayey, percs slowly.	Moderate: too clayey, percs slowly.	Severe: erodes easily.
CrA*:				
Cavo	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
CrA*:				
Jerauld	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Cs*:				
Cavo	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Stickney	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Df*:				
DeGrey	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Walke	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
DnB*:				
Delmont	Slight	Slight	Moderate: slope.	Slight.
Oahe	Slight	Slight	Moderate: slope, small stones.	Slight.
Du*:				
Durrstein	Severe: flooding, wetness, percs slowly.	Severe: wetness, excess sodium, excess salt.	Severe: wetness, percs slowly.	Severe: wetness.
Egas	Severe: flooding, wetness, too clayey.	Severe: wetness, too clayey, excess salt.	Severe: too clayey, wetness.	Severe: wetness, too clayey.
EpC*:				
Eakin	Slight	Slight	Severe: slope.	Slight.
Peno	Slight	Slight	Severe: slope.	Slight.
ErA*:				
Eakin	Slight	Slight	Slight	Slight.
Raber	Slight	Slight	Slight	Slight.
ErB*:				
Eakin	Slight	Slight	Moderate: slope.	Slight.
Raber	Slight	Slight	Moderate: slope.	Slight.
GfF*:				
Gettys	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
GfF*:				
Sansarc	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
GmB*:				
Glenham	Slight	Slight	Moderate: slope.	Slight.
Java	Slight	Slight	Moderate: slope.	Slight.
GnA*:				
Glenham	Slight	Slight	Moderate: slope.	Slight.
Java	Slight	Slight	Moderate: slope.	Slight.
Cavo	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
GrA*:				
Glenham	Slight	Slight	Slight	Slight.
Prosper	Severe: wetness.	Slight	Moderate: wetness.	Slight.
GrB*:				
Glenham	Slight	Slight	Moderate: slope.	Slight.
Prosper	Slight	Slight	Moderate: slope.	Slight.
GsA*:				
Glenham	Slight	Slight	Moderate: slope.	Slight.
Prosper	Severe: wetness.	Slight	Moderate: wetness.	Slight.
Hoven	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.
GtB*:				
Glenham	Slight	Slight	Moderate: slope.	Slight.
Prosper	Slight	Slight	Moderate: slope.	Slight.
Java	Slight	Slight	Moderate: slope.	Slight.
GuA*:				
Glenham	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
GuA*:				
Stickney	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Hoven	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.
HaA*:				
Henkin	Slight	Slight	Moderate: slope, small stones.	Slight.
Blendon	Slight	Slight	Slight	Slight.
HdA*:				
Highmore	Slight	Slight	Slight	Slight.
DeGrey	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
HdB*:				
Highmore	Slight	Slight	Moderate: slope.	Slight.
DeGrey	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
HeA*:				
Highmore	Slight	Slight	Slight	Slight.
Eakin	Slight	Slight	Slight	Slight.
HeB*:				
Highmore	Slight	Slight	Moderate: slope.	Slight.
Eakin	Slight	Slight	Moderate: slope.	Slight.
Ho Hoven	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.
HuB Hurley	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
JaC*:				
Java	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: large stones.
Glenham	Slight	Slight	Severe: slope.	Slight.
Prosper	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
JbD*:				
Java	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Betts	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
JcD*:				
Java	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Betts	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
JgB*:				
Java	Slight	Slight	Moderate: slope.	Slight.
Glenham	Slight	Slight	Moderate: slope.	Slight.
JgC*:				
Java	Slight	Slight	Severe: slope.	Slight.
Glenham	Slight	Slight	Severe: slope.	Slight.
JhC*:				
Java	Slight	Slight	Severe: slope.	Slight.
Glenham	Slight	Slight	Severe: slope.	Slight.
Prosper	Slight	Slight	Moderate: slope.	Slight.
JsA*:				
Jerauld	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Slickspots	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Slight.
Ko Kolls	Severe: wetness, percs slowly, too clayey.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: wetness, too clayey.
Lc Lawet	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.
Ma, Mb Macken	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
OaA Oahe	Slight	Slight	Moderate: small stones.	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
OdA*:				
Oahe	Slight	Slight	Moderate: small stones.	Slight.
Delmont	Slight	Slight	Slight	Slight.
OkB Oko	Slight	Slight	Moderate: slope.	Slight.
OkC Oko	Slight	Slight	Severe: slope.	Slight.
OkD Oko	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
OnA Onita	Slight	Slight	Slight	Slight.
Os*:				
Onita	Severe: wetness.	Slight	Moderate: wetness.	Slight.
Hoven	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.
OtB Opal	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey.	Severe: erodes easily.
OtC Opal	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Severe: slope.	Severe: erodes easily.
OuD*:				
Opal	Moderate: slope, percs slowly.	Moderate: slope, too clayey.	Severe: slope.	Severe: erodes easily.
Sansarc	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Ow Orthents, gravelly	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
OxD*:				
Orton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Talmo	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
PgD*:				
Peno	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Gettys	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Pk------------------- Plankinton	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
PrA------------------ Promise	Moderate: percs slowly.	Moderate: too clayey, percs slowly.	Moderate: too clayey, percs slowly.	Severe: erodes easily.
PrB------------------ Promise	Moderate: percs slowly.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey, percs slowly.	Severe: erodes easily.
Ps------------------- Prosper	Severe: wetness.	Slight---------------	Moderate: wetness.	Slight.
RaA------------------ Raber	Slight---------------	Slight---------------	Slight---------------	Slight.
RaB------------------ Raber	Slight---------------	Slight---------------	Moderate: slope.	Slight.
RcA*:				
Raber----------------	Slight---------------	Slight---------------	Slight---------------	Slight.
Cavo-----------------	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
RcB*:				
Raber----------------	Slight---------------	Slight---------------	Moderate: slope.	Slight.
Cavo-----------------	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
RpB*:				
Raber----------------	Slight---------------	Slight---------------	Moderate: slope.	Slight.
Peno-----------------	Slight---------------	Slight---------------	Moderate: slope.	Slight.
RpC*:				
Raber----------------	Slight---------------	Slight---------------	Severe: slope.	Slight.
Peno-----------------	Slight---------------	Slight---------------	Severe: slope.	Slight.
RrA------------------ Ree	Slight---------------	Slight---------------	Slight---------------	Slight.
RsF*:				
Rock outcrop---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Sansarc--------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
SbF*:				
Sansarc	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Opal	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
StA*:				
Stickney	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Java	Slight	Slight	Moderate: slope.	Slight.
SvA*:				
Stickney	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Java	Slight	Slight	Moderate: slope.	Slight.
Hoven	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.
TaE Talmo	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
TbA Talmo	Slight	Slight	Slight	Slight.
TcF*:				
Talmo	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope.
Java	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
TdD*:				
Talmo	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Delmont	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Te Tetonka	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Wd Wendte	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey, flooding.	Moderate: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
BdA*:									
Bend	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Edwin	Fair	Fair	Fair	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
BkE*:									
Betts	Very poor.	Very poor.	Fair	Very poor.	Very poor	Very poor.	Poor	Very poor.	Very poor.
Java	Very poor.	Very poor.	Good	Very poor	Poor	Very poor.	Poor	Very poor.	Very poor.
BkF*:									
Betts	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Java	Very poor.	Very poor.	Good	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Bn Bon	Very poor.	Good	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
BuA Bullcreek	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
CcA*:									
Capa	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Carter	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.
ClA*:									
Capa	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Slickspots	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
CpA*:									
Carter	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Promise	Fair	Fair	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
CrA*:									
Cavo	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Jerauld	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
Cs*:									
Cavo	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Stickney	Fair	Fair	Good	Good	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Df*:									
DeGrey	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Walke	Fair	Fair	Good	Good	Poor	Very poor.	Very poor.	Very poor.	Very poor.
DnB*:									
Delmont	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Oahe	Fair	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Du*:									
Durrstein	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair
Egas	Very poor.	Very poor.	Fair	Very poor.	Very poor	Very poor.	Very poor.	Poor	Poor
EpC*:									
Eakin	Fair	Good	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
Peno	Poor	Good	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
ErA*, ErB*:									
Eakin	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Raber	Good	Fair	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
GfF*:									
Gettys	Very poor.	Fair	Fair	Very poor.	Very poor	Very poor.	Poor	Very poor.	Very poor.
Sansarc	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
GmB*:									
Glenham	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Java	Fair	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
GnA*:									
Glenham	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
GnA*:									
Java	Fair	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Cavo	Poor	Poor	Poor	Poor	Very poor	Very poor.	Very poor.	Very poor.	Very poor.
GrA*:									
Glenham	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Prosper	Good	Good	Good	Good	Fair	Very poor.	Fair	Very poor.	Very poor.
GrB*:									
Glenham	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Prosper	Good	Good	Good	Good	Fair	Poor poor.	Fair	Very poor.	Very poor.
GsA*:									
Glenham	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Prosper	Good	Good	Good	Good	Fair	Very poor.	Fair	Very poor.	Very poor.
Hoven	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair
GtB*:									
Glenham	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Prosper	Good	Good	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
Java	Fair	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
GuA*:									
Glenham	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Stickney	Fair	Fair	Good	Good	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Hoven	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair
HaA*:									
Henkin	Fair	Fair	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
Blendon	Fair	Fair	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
	Potential for habitat elements								
HdA*, HdB*:									
Highmore----------	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
DeGrey-----------	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
HeA*, HeB*:									
Highmore----------	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Eakin------------	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Ho---------------- Hoven	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair
HuB--------------- Hurley	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
JaC*:									
Java--------------	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
Glenham-----------	Fair	Good	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
Prosper-----------	Good	Good	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
JbD*:									
Java-------------	Very poor.	Very poor.	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Betts------------	Very poor.	Very poor.	Fair	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
JcD*:									
Java--------------	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
Betts-------------	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
JgB*:									
Java--------------	Fair	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Glenham-----------	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
JgC*:									
Java--------------	Poor	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Glenham-----------	Fair	Good	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
JhC*:									
Java	Poor	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Glenham	Fair	Good	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
Prosper	Good	Good	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
JsA*:									
Jerauld	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Slickspots	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Ko Kolls	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair
Lc Lawet	Poor	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair
Ma Macken	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Fair	Fair
Mb Macken	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good
OaA Oahe	Fair	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
OdA*:									
Oahe	Fair	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Delmont	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
OkB Oko	Fair	Fair	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
OkC Oko	Poor	Fair	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
OkD Oko	Very poor.	Very poor.	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
OnA Onita	Good	Good	Good	Good	Poor	Poor	Fair	Very poor.	Very poor.
Os*:									
Onita	Good	Good	Good	Good	Poor	Poor	Fair	Very poor.	Very poor.
Hoven	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair
OtB Opal	Fair	Fair	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
OtC: Opal	Poor	Fair	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
OuD*: Opal	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
Sansarc	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Ow: Orthents, gravelly	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
OxD*: Orton	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Talmo	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
PqD*: Peno	Very poor.	Very poor.	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Gettys	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Pk: Plankinton	Poor	Poor	Poor	Very poor.	Poor	Very poor.	Poor	Fair	Fair
PrA, PrB: Promise	Fair	Fair	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
Ps: Prosper	Good	Good	Good	Good	Fair	Very poor.	Fair	Very poor.	Very poor.
RaA, RaB: Raber	Good	Fair	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
RcA*, RcB*: Raber	Good	Fair	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Cavo	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
RpB*: Raber	Good	Fair	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Peno	Fair	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
RpC*: Raber	Fair	Fair	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
Peno	Poor	Good	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
RrA: Ree	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
RsF*:									
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Sansarc	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
SbF*:									
Sansarc	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Opal	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
StA*:									
Stickney	Fair	Fair	Good	Good	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Java	Fair	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
SvA*:									
Stickney	Fair	Fair	Good	Good	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Java	Fair	Fair	Good	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Hoven	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair
TaE, TbA: Talmo	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
TcF*:									
Talmo	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Java	Very poor.	Very poor.	Good	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.
TdD*:									
Talmo	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Delmont	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.
Te: Tetonka	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Poor	Fair	Fair
Wd: Wendte	Very poor.	Very poor.	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
BdA*:					
Bend	Severe: cutbanks cave.	Slight	Slight	Slight	Severe: low strength.
Edwin	Severe: cutbanks cave.	Slight	Slight	Slight	Severe: low strength.
BkE*:					
Betts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Java	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
BkF*:					
Betts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Java	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Bn Bon	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.
BuA Bullcreek	Severe: cutbanks cave.	Severe: flooding, shrink swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength.
CcA*:					
Capa	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Carter	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
ClA*:					
Capa	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Slickspots	Moderate: wetness, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
CpA*:					
Carter	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Promise	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
CrA*:					
Cavo	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink swell.	Moderate: shrink-swell.	Severe: low strength.
Jerauld	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Cs*:					
Cavo	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Stickney	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Df*:					
DeGrey	Moderate: too clayey, wetness.	Severe: shrink-swell.	Moderate: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Walke	Moderate: too clayey, wetness.	Severe: shrink swell.	Moderate: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
DnB*:					
Delmont	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Oahe	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Du*:					
Durrstein	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
Egas	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
EpC*:					
Eakin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Peno	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
ErA*:					
Eakin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Raber	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
ErB*:					
Eakin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Raber	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
GfF*:					
Gettys	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.
Sansarc	Severe: depth to rock, slope.	Severe: slope, shrink-swell.	Severe: depth to rock, slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, slope, shrink-swell.
GmB*:					
Glenham	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Java	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
GnA*:					
Glenham	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Java	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Cavo	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
GrA*:					
Glenham	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Prosper	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.
GrB*:					
Glenham	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
GrB*:					
Prosper----------	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
GsA*:					
Glenham----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Prosper----------	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.
Hoven------------	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
GtB*:					
Glenham----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Prosper----------	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Java-------------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
GuA*:					
Glenham----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Stickney---------	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Hoven------------	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
HaA*:					
Henkin-----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Moderate: frost action.
Blendon----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Moderate: frost action.
HdA*:					
Highmore---------	Slight----------	Moderate: shrink-swell.	Slight----------	Moderate: shrink-swell.	Severe: low strength.
DeGrey-----------	Moderate: too clayey, wetness.	Severe: shrink-swell.	Moderate: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
HdB*:					
Highmore	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength.
DeGrey	Moderate: too clayey, wetness.	Severe: shrink-swell.	Moderate: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
HeA*:					
Highmore	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Severe: low strength.
Eakin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
HeB*:					
Highmore	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength.
Eakin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Ho Hoven	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink swell, low strength, ponding.
HuB Hurley	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
JaC*:					
Java	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Glenham	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Prosper	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
JbD*:					
Java	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
Betts	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
JcD*:					
Java	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
JcD*:					
Betts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
JgB*, JgC*:					
Java	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Glenham	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
JhC*:					
Java	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Glenham	Slight	Moderate: shrink-swell.	Moderate: shrink swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Prosper	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
JsA*:					
Jerauld	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Slickspots	Moderate: wetness.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Ko: Kolls	Severe: cutbanks cave, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
Lc: Lawet	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: frost action.
Ma, Mb: Macken	Severe: ponding.	Severe: ponding, shrink swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
OaA: Oahe	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
OdA*:					
Oahe	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Delmont	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
OkB, OkC: Oko	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
OkD: Oko	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.
OnA: Onita	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Os*: Onita	Moderate: too clayey, wetness.	Severe: wetness.	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: shrink swell, wetness, low strength.
Hoven	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
OtB, OtC: Opal	Severe: cutbanks cave.	Severe: shrink-swell.	Moderate: depth to rock.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
OuD*: Opal	Severe: cutbanks cave.	Severe: shrink-swell.	Moderate: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.
Sansarc	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, shrink-swell.
Ow: Orthents, gravelly	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
OxD*: Orton	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Talmo	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PgD*: Peno	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.
Gettys	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Pk: Plankinton	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
PrA, PrB: Promise	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Ps: Prosper	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.
RaA, RaB: Raber	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
RcA*: Raber	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Cavo	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
RcB*: Raber	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Cavo	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
RpB*, RpC*: Raber	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Peno	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
RrA: Ree	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Severe: low strength.
RsF*: Rock outcrop	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.
Sansarc	Severe: depth to rock, slope.	Severe: slope, shrink-swell.	Severe: depth to rock, slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, slope, shrink-swell.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
SbF*:					
Sansarc	Severe: depth to rock, slope.	Severe: slope, shrink-swell.	Severe: depth to rock, slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, slope, shrink-swell.
Opal	Severe: cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.
StA*:					
Stickney	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Java	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
SvA*:					
Stickney	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Java	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Hoven	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
TaE: Talmo	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
TbA: Talmo	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
TcF*:					
Talmo	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Java	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
TdD*:					
Talmo	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Delmont	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Te: Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Wd----------------- Wendte	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BdA*:					
Bend	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: thin layer.
Edwin	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey, too sandy.	Slight	Poor: too clayey.
BkE*:					
Betts	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Java	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
BkF*:					
Betts	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Java	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Bn Bon	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
BuA Bullcreek	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: flooding.	Poor: too clayey, hard to pack.
CcA*:					
Capa	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
Carter	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
ClA*:					
Capa	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ClA*:					
Slickspots	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey, excess salt.	Severe: wetness.	Poor: too clayey, excess salt.
CpA*:					
Carter	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Promise	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
CrA*:					
Cavo	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
Jerauld	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
Cs*:					
Cavo	Severe: percs slowly.	Slight	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
Stickney	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, excess sodium.	Moderate: wetness.	Poor: hard to pack, excess sodium.
Df*:					
DeGrey	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: excess sodium.	Slight	Poor: hard to pack, excess sodium.
Walke	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
DnB*:					
Delmont	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Oahe	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Du*:					
Durrstein	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Egas	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
EpC*:					
Eakin	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Peno	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
ErA*:					
Eakin	Severe: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Raber	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
ErB*:					
Eakin	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Raber	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
GfF*:					
Gettys	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Sansarc	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope.	Poor: depth to rock, hard to pack, slope.
GmB*:					
Glenham	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Java	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GnA*:					
Glenham	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Java	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Cavo	Severe: percs slowly.	Slight	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
GrA*:					
Glenham	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Prosper	Severe: wetness, percs slowly.	Moderate: seepage, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
GrB*:					
Glenham	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Prosper	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey.
GsA*:					
Glenham	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Prosper	Severe: wetness, percs slowly.	Moderate: seepage, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Hoven	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
GtB*:					
Glenham	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Prosper	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey.
Java	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GuA*:					
Glenham	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Stickney	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, excess sodium.	Moderate: wetness.	Poor: hard to pack, excess sodium.
Hoven	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
HaA*:					
Henkin	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
Blendon	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
HdA*:					
Highmore	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
DeGrey	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: excess sodium.	Slight	Poor: hard to pack, excess sodium.
HdB*:					
Highmore	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
DeGrey	Severe: wetness, percs slowly.	Moderate: slope, wetness.	Severe: excess sodium.	Slight	Poor: hard to pack, excess sodium.
HeA*:					
Highmore	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Eakin	Severe: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
HeB*:					
Highmore	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Eakin	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Ho: Hoven	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HuB------------ Hurley	Severe: thin layer, seepage, percs slowly.	Severe: seepage.	Severe: seepage, excess sodium.	Moderate: seepage.	Poor: area reclaim, hard to pack, excess sodium.
JaC*:					
Java------------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
Glenham---------	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
Prosper---------	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: wetness, too clayey.	Slight----------	Fair: too clayey.
JbD*:					
Java------------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Betts-----------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
JcD*:					
Java------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Betts-----------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
JgB*:					
Java------------	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
Glenham---------	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
JgC*:					
Java------------	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
Glenham---------	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
JhC*:					
Java------------	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
Glenham---------	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
JhC*:					
Prosper	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey.
JsA*:					
Jerauld	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
Slickspots	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey, excess salt.	Slight	Poor: excess salt.
Ko: Kolls	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Lc: Lawet	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
Ma, Mb: Macken	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
OaA: Oahe	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
OdA*:					
Oahe	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Delmont	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
OkB: Oko	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
OkC: Oko	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
OkD: Oko	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
OnA: Onita	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Poor: hard to pack.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Os*:					
Onita	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
Hoven	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
OtB Opal	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
OtC Opal	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
OuD*:					
Opal	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Sansarc	Severe: depth to rock, seepage.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
Ow Orthents, gravelly	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
OxD*:					
Orton	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Talmo	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
PgD*:					
Peno	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Gettys	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Pk Plankinton	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PrA: Promise	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
PrB: Promise	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Ps: Prosper	Severe: wetness, percs slowly.	Moderate: seepage, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
RaA: Raber	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
RaB: Raber	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
RcA*:					
Raber	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Cavo	Severe: percs slowly.	Slight	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
RcB*:					
Raber	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Cavo	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
RpB*:					
Raber	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Peno	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
RpC*:					
Raber	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Peno	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
RrA: Ree	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RsF*:					
Rock outcrop	Severe: depth to rock, slope, seepage.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope, seepage.
Sansarc	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope.	Poor: depth to rock, hard to pack, slope.
SbF*:					
Sansarc	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope.	Poor: depth to rock, hard to pack, slope.
Opal	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
StA*:					
Stickney	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, excess sodium.	Moderate: wetness.	Poor: hard to pack, excess sodium.
Java	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
SvA*:					
Stickney	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, excess sodium.	Moderate: wetness.	Poor: hard to pack, excess sodium.
Java	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Hoven	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
TaE: Talmo	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
TbA: Talmo	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
TcF*:					
Talmo	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TcF*:					
Java	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
TdD*:					
Talmo	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Delmont	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Te: Tetonka	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Wd: Wendte	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BdA*:				
Bend	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Edwin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
BkE*:				
Betts	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
BkF*:				
Betts	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Java	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Bn Bon	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
BuA Bullcreek	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
CcA*:				
Capa	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Carter	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ClA*:				
Capa	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Slickspots	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CpA*:				
Carter	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Promise	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CrA*:				
Cavo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Jerauld	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Cs*:				
Cavo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Stickney	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Df*:				
DeGrey	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Walke	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
DnB*:				
Delmont	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Oahe	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Du*:				
Durrstein	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.
Egas	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
EpC*:				
Eakin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.
Peno	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ErA*, ErB*:				
Eakin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.
Raber	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GfF*:				
Gettys	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Sansarc	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
GmB*:				
Glenham	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
GnA*:				
Glenham	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Cavo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
GrA*, GrB*:				
Glenham	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GsA*:				
Glenham	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Hoven	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.
GtB*:				
Glenham	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
GuA*:				
Glenham	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Stickney	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Hoven	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.
HaA*:				
Henkin	Good	Probable	Improbable: too sandy.	Fair: small stones.
Blendon	Good	Probable	Improbable: too sandy.	Fair: small stones.
HdA*, HdB*:				
Highmore	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
DeGrey	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
HeA*, HeB*:				
Highmore	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HeA*, HeB*:				
Eakin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.
Ho: Hoven	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.
HuB: Hurley	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
JaC*:				
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Glenham	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
JbD*:				
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Betts	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
JcD*:				
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Betts	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
JgB*, JgC*:				
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Glenham	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
JhC*:				
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
JhC*:				
Glenham	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
JsA*:				
Jerauld	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Slickspots	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
Ko Kolls	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Lc Lawet	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ma, Mb Macken	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
OaA Oahe	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
OdA*:				
Oahe	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Delmont	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
OkB, OkC, OkD Oko	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
OnA Onita	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Os*:				
Onita	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Hoven	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
OtB, OtC: Opal	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
OuD*:				
Opal	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Sansarc	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Ow: Orthents, gravelly	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
OxD*:				
Orton	Fair: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Talmo	Fair: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
PgD*:				
Peno	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Gettys	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Pk: Plankinton	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
PrA, PrB: Promise	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Ps: Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
RaA, RaB: Raber	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
RcA*, RcB*:				
Raber	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Cavo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RpB*, RpC*:				
Raber	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Peno	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
RrA: Ree	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
RsF*:				
Rock outcrop	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, area reclaim, slope.
Sansarc	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
SbF*:				
Sansarc	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Opal	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
StA*:				
Stickney	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
SvA*:				
Stickney	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Hoven	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
TaE: Talmo	Fair: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
TbA: Talmo	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
TcF*:				
Talmo	Fair: large stones, slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Java	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
TdD*:				
Talmo	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Delmont	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Te: Tetonka	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Wd: Wendte	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
BdA*:						
Bend	Moderate: seepage.	Severe: piping.	Deep to water	Percs slowly, excess salt.	Erodes easily	Erodes easily, percs slowly.
Edwin	Moderate: seepage.	Severe: piping.	Deep to water	Percs slowly, excess salt.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
BkE*, BkF*:						
Betts	Severe: slope.	Moderate: piping.	Deep to water	Slope, excess salt.	Slope, erodes easily.	Slope, erodes easily.
Java	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
Bn: Bon	Severe: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
BuA: Bullcreek	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, droughty, slow intake.	Erodes easily, percs slowly.	Erodes easily, droughty.
CcA*:						
Capa	Slight	Severe: hard to pack, excess sodium.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
Carter	Slight	Severe: hard to pack.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
ClA*:						
Capa	Slight	Severe: hard to pack, excess sodium.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
Slickspots	Moderate: slope.	Severe: excess salt.	Deep to water	Droughty, excess salt.	Erodes easily, percs slowly.	Excess salt, erodes easily, percs slowly.
CpA*:						
Carter	Slight	Severe: hard to pack.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Promise	Slight	Severe: hard to pack.	Deep to water	Droughty, slow intake.	Erodes easily, percs slowly.	Erodes easily, droughty.
CrA*:						
Cavo	Slight	Severe: excess sodium.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
Jerauld	Slight	Severe: hard to pack, excess sodium.	Deep to water	Droughty	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Cs*:						
Cavo	Slight	Severe: excess sodium.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
Stickney	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
Df*:						
DeGrey	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, erodes easily.	Erodes easily	Excess sodium, erodes easily, percs slowly.
Walke	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, erodes easily, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
DnB*:						
Delmont	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty, rooting depth.	Too sandy	Droughty, rooting depth.
Oahe	Severe: seepage.	Severe: seepage.	Deep to water	Slope	Too sandy	Favorable.
Du*:						
Durrstein	Slight	Severe: hard to pack, wetness, excess sodium.	Percs slowly, flooding, excess salt.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, excess salt, excess sodium.
Egas	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, droughty, slow intake.	Wetness, percs slowly.	Wetness, excess salt.
EpC*:						
Eakin	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Peno	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly, excess salt.	Percs slowly	Percs slowly.
ErA*:						
Eakin	Moderate: seepage.	Severe: hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
Raber	Slight	Moderate: piping, hard to pack.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly.
ErB*:						
Eakin	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Raber	Moderate: slope.	Moderate: piping, hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
GfF*:						
Gettys	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Sansarc	Severe: depth to rock, slope, seepage.	Severe: hard to pack.	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.
GmB*:						
Glenham	Moderate: slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Java	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
GnA*:						
Glenham	Slight	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Java	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Cavo	Slight	Severe: excess sodium.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
GrA*:						
Glenham	Slight	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Prosper	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Favorable	Favorable.
GrB*:						
Glenham	Moderate: slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Prosper	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
GsA*:						
Glenham	Moderate: slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Prosper	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Favorable	Favorable.
Hoven	Slight	Severe: hard to pack, ponding, excess sodium.	Ponding, percs slowly, excess salt.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
GtB*:						
Glenham	Moderate: slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Prosper	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
GtB*:						
Java	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
GuA*:						
Glenham	Slight	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Stickney	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
Hoven	Slight	Severe: hard to pack, ponding, excess sodium.	Ponding, percs slowly, excess salt.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
HaA*:						
Henkin	Severe: seepage.	Severe: piping.	Deep to water	Droughty	Soil blowing	Droughty.
Blendon	Severe: seepage.	Severe: seepage, piping.	Deep to water	Soil blowing	Too sandy, soil blowing.	Favorable.
HdA*:						
Highmore	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
DeGrey	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, erodes easily.	Erodes easily	Excess sodium, erodes easily, percs slowly.
HdB*:						
Highmore	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
DeGrey	Moderate: slope.	Severe: hard to pack, excess sodium.	Deep to water	Slope, percs slowly, erodes easily.	Erodes easily	Excess sodium, erodes easily, percs slowly.
HeA*:						
Highmore	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Eakin	Moderate: seepage.	Severe: hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
HeB*:						
Highmore	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Eakin	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Ho: Hoven	Slight	Severe: hard to pack, ponding, excess sodium.	Ponding, percs slowly, excess salt.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
HuB------------- Hurley	Moderate: seepage, slope.	Severe: hard to pack, excess sodium.	Deep to water	Slope, droughty, percs slowly.	Area reclaim, erodes easily.	Excess sodium, erodes easily.
JaC*:						
Java-------------	Moderate: slope.	Moderate: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
Glenham----------	Moderate: slope.	Moderate: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
Prosper----------	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----------	Favorable------	Favorable.
JbD*:						
Java-------------	Severe: slope.	Moderate: piping.	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
Betts------------	Severe: slope.	Moderate: piping.	Deep to water	Slope, excess salt.	Slope, erodes easily.	Slope, erodes easily.
JcD*:						
Java-------------	Severe: slope.	Moderate: piping.	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
Betts------------	Severe: slope.	Moderate: piping, large stones.	Deep to water	Slope, excess salt.	Slope, large stones.	Large stones, slope.
JgB*, JgC*:						
Java-------------	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
Glenham----------	Moderate: slope.	Moderate: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
JhC*:						
Java-------------	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
Glenham----------	Moderate: slope.	Moderate: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
Prosper----------	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----------	Favorable------	Favorable.
JsA*:						
Jerauld----------	Slight---------	Severe: hard to pack, excess sodium.	Deep to water	Droughty-------	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
Slickspots-------	Slight---------	Severe: excess salt.	Deep to water	Slope, percs slowly, excess salt.	Erodes easily, percs slowly.	Excess salt, erodes easily, percs slowly.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ko: Kolls	Slight	Severe: hard to pack, wetness.	Percs slowly	Wetness, droughty, slow intake.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, droughty.
Lc: Lawet	Severe: seepage.	Severe: wetness.	Frost action	Wetness	Wetness	Wetness.
Ma: Macken	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly.	Ponding, droughty.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, droughty.
Mb: Macken	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
OaA: Oahe	Severe: seepage.	Severe: seepage.	Deep to water	Favorable	Too sandy	Favorable.
OdA*:						
Oahe	Severe: seepage.	Severe: seepage.	Deep to water	Favorable	Too sandy	Favorable.
Delmont	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, rooting depth.	Too sandy	Droughty, rooting depth.
OkB, OkC: Oko	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty, percs slowly.	Erodes easily, percs slowly.	Erodes easily, droughty.
OkD: Oko	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, erodes easily, percs slowly.	Slope, erodes easily, droughty.
OnA: Onita	Slight	Moderate: piping, hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
Os*:						
Onita	Slight	Moderate: piping, hard to pack, wetness.	Frost action, wetness.	Wetness	Erodes easily, wetness.	Erodes easily.
Hoven	Slight	Severe: hard to pack, ponding, excess sodium.	Ponding, percs slowly, excess salt.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
OtB, OtC: Opal	Moderate: depth to rock, slope.	Slight	Deep to water	Slope, droughty, slow intake.	Depth to rock, erodes easily.	Erodes easily, droughty.
OuD*:						
Opal	Severe: slope.	Slight	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.
Sansarc	Severe: depth to rock, slope, seepage.	Severe: hard to pack.	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ow---------------- Orthents, gravelly	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty, rooting depth.
OxD*:						
Orton------------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty.
Talmo------------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty.
PgD*:						
Peno-------------	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly, excess salt.	Slope, percs slowly.	Slope, percs slowly.
Gettys-----------	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Pk---------------- Plankinton	Slight----------	Severe: ponding.	Ponding, percs slowly.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
PrA--------------- Promise	Slight----------	Severe: hard to pack.	Deep to water	Droughty, slow intake.	Erodes easily, percs slowly.	Erodes easily, droughty.
PrB--------------- Promise	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, droughty, slow intake.	Erodes easily, percs slowly.	Erodes easily, droughty.
Ps---------------- Prosper	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness--------	Favorable------	Favorable.
RaA--------------- Raber	Slight----------	Moderate: piping, hard to pack.	Deep to water	Percs slowly---	Erodes easily, percs slowly.	Erodes easily, percs slowly.
RaB--------------- Raber	Moderate: slope.	Moderate: piping, hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
RcA*:						
Raber------------	Slight----------	Moderate: piping, hard to pack.	Deep to water	Percs slowly---	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Cavo-------------	Slight----------	Severe: excess sodium.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
RcB*:						
Raber------------	Moderate: slope.	Moderate: piping, hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
RcB*:						
Cavo	Moderate: slope.	Severe: excess sodium.	Deep to water	Slope, droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
RpB*, RpC*:						
Raber	Moderate: slope.	Moderate: piping, hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Peno	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly, excess salt.	Percs slowly	Percs slowly.
RrA: Ree	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
RsF*:						
Rock outcrop	Severe: seepage, depth to rock, slope.	Severe: hard to pack.	Deep to water	Slope, depth to rock, rooting depth.	Slope, depth to rock.	Slope, depth to rock, rooting depth.
Sansarc	Severe: depth to rock, slope, seepage.	Severe: hard to pack.	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.
SbF*:						
Sansarc	Severe: depth to rock, slope, seepage.	Severe: hard to pack.	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.
Opal	Severe: slope.	Slight	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.
StA*:						
Stickney	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
Java	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
SvA*:						
Stickney	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
Java	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Hoven	Slight	Severe: hard to pack, ponding, excess sodium.	Ponding, percs slowly, excess salt.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
TaE: Talmo	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty.
TbA: Talmo	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
TcF*:						
Talmo	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, large stones, droughty.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Java	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
TdD*:						
Talmo	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty.
Delmont	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, rooting depth.	Slope, too sandy.	Slope, droughty, rooting depth.
Te: Tetonka	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Wd: Wendte	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
BdA*:											
Bend	0-8	Loam	ML, CL	A-4, A-6, A-7	0	100	100	90-100	60-80	30-45	5-20
	8-13	Silt loam, loam, clay loam.	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	13-38	Silt loam, loam	CL, ML	A-4, A-6, A-7	0	100	100	95-100	85-100	30-45	5-20
	38-60	Stratified very fine sand to clay.	CL, CL-ML, ML	A-4, A-6, A-7	0	100	100	95-100	80-100	25-50	3-25
Edwin	0-9	Silt loam	CL, ML	A-4, A-6	0	100	95-100	85-100	75-100	30-40	5-15
	9-27	Silt loam, loam	CL, ML	A-4, A-6	0	100	95-100	90-100	85-100	30-40	5-15
	27-37	Silt loam, loam	CL, ML	A-4, A-6	0	100	95-100	90-100	80-100	30-40	5-15
	37-60	Stratified very fine sand to clay.	CL, ML, CL-ML	A-4, A-6, A-7	0	100	100	95-100	80-100	20-50	3-25
BkE*, BkF*:											
Betts	0-2	Loam	CL, CL-ML	A-4, A-6	0-5	90-100	80-100	75-100	60-75	20-38	5-15
	2-50	Loam, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
	50-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
Java	0-4	Loam	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25
Bn	0-12	Loam	CL-ML, CL	A-4, A-6	0	100	90-100	80-95	60-85	25-40	5-15
Bon	12-27	Stratified silty clay loam to fine sandy loam.	CL, CL-ML, ML, SM	A-4, A-6	0	100	95-100	80-95	60-85	23-40	3-15
	27-60	Stratified silty clay loam to fine sandy loam.	ML, SM, CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	75-95	45-95	25-45	3-22
BuA	0-2	Clay	MH, CH	A-7	0	95-100	95-100	90-100	85-100	60-100	28-60
Bullcreek	2-8	Clay	MH, CH	A-7	0	95-100	95-100	90-100	85-100	70-100	35-60
	8-13	Clay	MH, CH	A-7	0	95-100	95-100	90-100	85-100	70-100	35-60
	13-60	Clay	CH	A-7	0	95-100	95-100	90-100	85-100	70-100	40-60
CcA*:											
Capa	0-2	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-40	7-20
	2-15	Clay	CH, MH	A-7	0	100	100	95-100	90-100	60-85	25-50
	15-60	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	90-100	60-85	25-50
Carter	0-6	Silt loam	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	6-18	Clay	CH, MH	A-7	0	100	100	90-100	90-100	60-85	25-50
	18-60	Clay, silty clay	CH, MH	A-7	0	100	100	90-100	90-100	55-80	25-50
ClA*:											
Capa	0-2	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-40	7-20
	2-15	Clay	CH, MH	A-7	0	100	100	95-100	90-100	60-85	25-50
	15-60	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	90-100	60-85	25-50
Slickspots	0-60	Clay	CH	A-7	0	100	100	90-100	85-100	55-80	25-55

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
CpA*:											
Carter	0-6	Silt loam	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	6-18	Clay	CH, MH	A-7	0	100	100	90-100	90-100	60-85	25-50
	18-60	Clay, silty clay	CH, MH	A-7	0	100	100	90-100	90-100	55-80	25-50
Promise	0-8	Silty clay	CH, MH	A-7	0	100	100	90-100	80-100	55-90	25-55
	8-43	Clay	CH, MH	A-7	0	100	100	90-100	85-100	60-85	25-50
	43-60	Clay, silty clay, silty clay loam.	CH, MH, CL	A-7, A-6	0	100	100	90-100	85-100	50-90	25-55
CrA*:											
Cavo	0-7	Loam	CL, CL-ML	A-4, A-6	0	100	95-100	85-100	60-85	25-40	5-20
	7-18	Clay loam, clay	CL, CH	A-7	0	100	95-100	90-100	70-95	40-65	15-35
	18-60	Clay loam, clay	CL, CH	A-7, A-6	0-5	95-100	95-100	85-100	60-95	36-55	15-30
Jerauld	0-5	Loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	60-100	25-40	5-15
	5-10	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-95	45-70	20-40
	10-60	Silty clay, clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	55-90	40-85	20-45
Cs*:											
Cavo	0-7	Loam	CL, CL-ML	A-4, A-6	0	100	95-100	85-100	60-85	25-40	5-20
	7-18	Clay loam, clay	CL, CH	A-7	0	100	95-100	90-100	70-95	40-65	15-35
	18-60	Clay loam, clay	CL, CH	A-7, A-6	0-5	95-100	95-100	85-100	60-95	36-55	15-30
Stickney	0-6	Loam	CL	A-4, A-6	0	95-100	95-100	85-100	60-85	28-35	9-15
	6-32	Clay loam, silty clay loam, silty clay.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-95	40-60	14-34
	32-60	Clay loam, loam	CL, CH, MH, ML	A-6, A-7	0-5	95-100	90-100	80-100	55-90	35-60	10-35
Df*:											
DeGrey	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-100	24-40	3-15
	8-18	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	80-100	40-65	15-35
	18-39	Silty clay, silty clay loam.	CL, CH	A-7	0	100	95-100	90-100	80-100	40-65	15-35
	39-60	Loam, clay loam	CL, CH, MH, ML	A-6, A-7	0	100	95-100	90-100	80-100	30-65	12-32
Walke	0-7	Silt loam	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	80-100	24-40	3-15
	7-33	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	85-100	40-55	15-28
	33-60	Clay loam, clay	CL, CH, MH, ML	A-7	0	95-100	95-100	90-100	70-90	40-65	15-30
DnB*:											
Delmont	0-5	Loam	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	5-17	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SC-SM	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	17-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SM, SW-SM, SC-SM, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	15-25	NP-5

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
DnB*:											
Oahe	0-7	Loam	ML, CL	A-4, A-6, A-7	0	90-100	85-100	60-95	50-80	30-45	5-20
	7-23	Loam, clay loam	CL, ML	A-4, A-6, A-7	0	80-100	80-100	60-95	50-75	30-45	5-20
	23-33	Loam, sandy loam	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6, A-7	0	80-95	70-95	50-95	30-75	20-45	5-20
	33-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SW, SM, GW, SC-SM	A-1, A-2, A-3	0	30-85	30-75	10-60	0-30	15-25	NP-7
Du*:											
Durrstein	0-6	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	20-35	3-15
	6-19	Silty clay, clay, clay loam.	CH, MH	A-7	0	95-100	95-100	85-100	65-95	50-85	20-50
	19-60	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	85-100	60-95	40-75	15-50
Egas	0-4	Silty clay	CH, MH	A-7	0	100	100	95-100	90-100	50-90	21-55
	4-60	Silty clay, silty clay loam, clay.	CH, MH	A-7	0	100	100	90-100	85-100	50-90	22-50
EpC*:											
Eakin	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	7-29	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	95-100	80-100	35-50	10-25
	29-60	Clay loam, loam, clay.	CL, CH	A-7	0	95-100	85-100	75-100	60-95	40-70	16-42
Peno	0-5	Loam	ML, CL	A-6, A-7, A-4	0-5	95-100	95-100	85-95	60-75	30-45	5-20
	5-9	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	85-95	70-85	40-65	15-35
	9-60	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	85-95	70-85	45-80	20-45
ErA*, ErB*:											
Eakin	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	7-29	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	95-100	80-100	35-50	10-25
	29-60	Clay loam, loam, clay.	CL, CH	A-7	0	95-100	85-100	75-100	60-95	40-70	16-42
Raber	0-5	Loam	CL	A-6	0	100	100	85-95	60-75	30-40	10-20
	5-17	Clay loam, clay	CL, CH	A-6, A-7	0	100	100	90-100	70-95	35-60	11-35
	17-60	Clay loam, clay	CL, CH	A-6, A-7	0	100	100	90-100	70-90	30-60	11-35
GfF*:											
Gettys	0-3	Clay loam	CL, CH	A-7	0	95-100	90-100	85-100	70-85	40-60	15-30
	3-24	Clay loam, clay	CL, CH	A-7	0	95-100	90-100	85-100	60-80	40-60	15-30
	24-60	Clay loam, clay	CL, CH, MH, ML	A-7	0	95-100	90-100	85-100	60-80	40-60	10-30
Sansarc	0-4	Clay	CH, MH	A-7	0	100	95-100	90-100	75-100	60-90	25-55
	4-18	Clay	CH, MH	A-7	0	95-100	95-100	95-100	85-100	60-90	25-55
	18-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
GmB*:											
Glenham----------	0-3	Loam-------------	CL, ML	A-6, A-7, A-4	0	95-100	95-100	85-100	60-85	30-50	8-20
	3-13	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	50-85	30-50	10-25
	13-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-95	50-85	30-50	10-30
Java-------------	0-4	Loam-------------	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25
GnA*:											
Glenham----------	0-3	Loam-------------	CL, ML	A-6, A-7, A-4	0	95-100	95-100	85-100	60-85	30-50	8-20
	3-13	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	50-85	30-50	10-25
	13-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-95	50-85	30-50	10-30
Java-------------	0-4	Loam-------------	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A 7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25
Cavo-------------	0-7	Loam-------------	CL, CL-ML	A-4, A-6	0	100	95-100	85-100	60-85	25-40	5-20
	7-18	Clay loam, clay	CL, CH	A-7	0	100	95-100	90-100	70-95	40-65	15-35
	18-60	Clay loam, clay	CL, CH	A-7, A-6	0-5	95-100	95-100	85-100	60-95	36-55	15-30
GrA*:											
Glenham----------	0-3	Loam-------------	CL, ML	A-6, A-7, A-4	0	95-100	95-100	85-100	60-85	30-50	8-20
	3-13	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	50-85	30-50	10-25
	13-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-95	50-85	30-50	10-30
Prosper----------	0-13	Loam-------------	CL	A-4, A 6	0	95-100	95-100	80-100	50-90	28-35	9-15
	13-28	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	28-36	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	36-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10 25
GrB*:											
Glenham----------	0-3	Loam-------------	CL, ML	A-6, A-7, A-4	0	95-100	95-100	85-100	60-85	30-50	8-20
	3-13	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	50-85	30-50	10-25
	13-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-95	50-85	30-50	10-30
Prosper----------	0-13	Loam-------------	CL	A-4, A-6	0	95-100	95-100	85-100	60-80	28-35	9-15
	13-28	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	28-36	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	36-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
GsA*:											
Glenham----------	0-3	Loam-------------	CL, ML	A-6, A-7, A-4	0	95-100	95-100	85-100	60-85	30-50	8-20
	3-13	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	50-85	30-50	10-25
	13-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-95	50-85	30-50	10-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
GsA*:											
Prosper----------	0-13	Loam-------------	CL	A-4, A-6	0	95-100	95-100	80-100	50-90	28-35	9-15
	13-28	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	28-36	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	36-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
Hoven------------	0-3	Silt loam--------	ML, CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	75-95	27-45	5-20
	3-7	Silty clay, clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	7-25	Silty clay, clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	25-60	Silty clay, clay, clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	80-100	60-100	35-75	11-45
GtB*:											
Glenham----------	0-3	Loam-------------	CL, ML	A-6, A-7, A-4	0	95-100	95-100	85-100	60-85	30-50	8-20
	3-13	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	50-85	30-50	10-25
	13-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-95	50-85	30-50	10-30
Prosper----------	0-13	Loam-------------	CL	A-4, A-6	0	95-100	95-100	85-100	60-80	28-35	9-15
	13-28	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	28-36	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	36-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
Java-------------	0-4	Loam-------------	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25
GuA*:											
Glenham----------	0-3	Loam-------------	CL, ML	A-6, A-7, A-4	0	95-100	95-100	85-100	60-85	30-50	8-20
	3-13	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	50-85	30-50	10-25
	13-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-95	50-85	30-50	10-30
Stickney---------	0-6	Loam-------------	CL	A-4, A-6	0	95-100	95-100	85-100	60-85	28-35	9-15
	6-32	Clay loam, silty clay loam, silty clay.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-95	40-60	14-34
	32-60	Clay loam, loam	CL, CH, MH, ML	A-6, A-7	0-5	95-100	90-100	80-100	55-90	35-60	10-35
Hoven------------	0-3	Silt loam--------	ML, CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	75-95	27-45	5-20
	3-7	Silty clay, clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	7-25	Silty clay, clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	25-60	Silty clay, clay, clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	80-100	60-100	35-75	11-45

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
HaA*:											
Henkin----------	0-18	Fine sandy loam	SM, SC, ML, CL	A-4	0-5	90-100	80-100	65-100	35-55	15-30	NP-10
	18-27	Loam, sandy loam, fine sandy loam.	SM, SC, ML, CL	A-4	0-5	90-100	80-100	65-100	35-60	15-30	NP-10
	27-60	Stratified fine sand to clay loam.	SM, SC, SP-SM, SC-SM	A-2, A-4, A-1, A-3	0-5	90-100	80-100	35-95	5-50	15-35	NP-10
Blendon---------	0-16	Fine sandy loam	SM	A-4	0	100	90-100	60-100	35-50	20-30	NP-5
	16-40	Fine sandy loam, sandy loam, loam.	SM, SC, ML, CL	A-4, A-2	0	100	85-100	60-100	20-60	20-33	NP-10
	40-48	Fine sandy loam, sandy loam, loamy sand.	SM	A-4, A-2	0	100	85-100	60-100	20-45	20-30	NP-5
	48-60	Fine sandy loam, loamy fine sand, loamy sand.	SP-SM, SM, SC-SM, SC	A-2, A-4	0	85-100	75-100	50-100	10-45	15-30	NP-10
HdA*, HdB*:											
Highmore -------	0-7	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	95-100	95-100	90-100	30-45	5-20
	7-24	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	90-100	85-100	35-50	10-25
	24-60	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	90-100	85-100	35-50	10-25
DeGrey----------	0-8	Silt loam------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-100	24-40	3-15
	8-18	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	80-100	40-65	15-35
	18-39	Silty clay, silty clay loam.	CL, CH	A-7	0	100	95-100	90-100	80-100	40-65	15-35
	39-60	Loam, clay loam	CL, CH, MH, ML	A-6, A-7	0	100	95-100	90-100	80-100	30-65	12-32
HeA*, HeB*:											
Highmore--------	0-7	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	95-100	95-100	90-100	30-45	5-20
	7-24	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	90-100	85-100	35-50	10-25
	24-60	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	90-100	85-100	35-50	10-25
Eakin-----------	0-7	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	7-29	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	95-100	80-100	35-50	10-25
	29-60	Clay loam, loam, clay.	CL, CH	A-7	0	95-100	85-100	75-100	60-95	40-70	16-42
Ho-------------- Hoven	0-3	Silt loam--------	ML, CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	75-95	27-45	5-20
	3-7	Silty clay, clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	7-25	Silty clay, clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	25-60	Silty clay, clay, clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	80-100	60-100	35-75	11-45

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
HuB------------- Hurley	0-2	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	2-30	Clay-----	CH, MH	A-7	0	100	100	85-100	80-100	60-90	30-50
	30-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
JaC*:											
Java------------	0-4	Stony loam-------	CL, CL-ML	A-4, A-6	20-30	85-100	70-90	65-85	55-80	25-40	5-15
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	55-80	30-45	10-25
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	55-80	30-50	10-25
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	55-80	30-50	10-25
Glenham---------	0-3	Loam-------------	CL, ML	A-6, A-7, A-4	0	95-100	95-100	85-100	60-85	30-50	8-20
	3-13	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	50-85	30-50	10-25
	13-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-95	50-85	30-50	10-30
Prosper---------	0-13	Loam-------------	CL	A-4, A-6	0	95-100	95-100	85-100	60-80	28-35	9-15
	13-28	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	28-36	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	36-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
JbD*:											
Java------------	0-4	Loam-------------	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25
Betts-----------	0-2	Loam-------------	CL, CL-ML	A-4, A-6	0-5	90-100	80-100	75-100	60-75	20-38	5-15
	2-50	Loam, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
	50-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
JcD*:											
Java------------	0-4	Loam-------------	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25
Betts-----------	0-2	Stony loam--	CL, CL-ML	A-4, A-6	10-25	100	90-100	85-100	60-75	25-40	5-15
	2-50	Loam, clay loam, stony clay loam.	CL	A-6, A-7	5-20	100	90-100	85-100	50-85	30-45	10-20
	50-60	Loam, clay loam, stony clay loam.	CL	A-6, A-7	5-20	100	90-100	85-100	50-85	30-45	10-20
JgB*, JgC*:											
Java------------	0-4	Loam-------------	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25
Glenham---------	0-3	Loam-------------	CL, ML	A-6, A-7, A-4	0	95-100	95-100	85-100	60-85	30-50	8-20
	3-13	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	50-85	30-50	10-25
	13-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-95	50-85	30-50	10-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
JhC*:											
Java	0-4	Loam	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25
Glenham	0-3	Loam	CL, ML	A-6, A-7, A-4	0	95-100	95-100	85-100	60-85	30-50	8-20
	3-13	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	50-85	30-50	10-25
	13-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-95	50-85	30-50	10-30
Prosper	0-13	Loam	CL	A-4, A-6	0	95-100	95-100	85-100	60-80	28-35	9-15
	13-28	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	28-36	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	36-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
JsA*:											
Jerauld	0-5	Loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	60-100	25-40	5-15
	5-10	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-95	45-70	20-40
	10-60	Silty clay, clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	55-90	40-85	20-45
Slickspots	0-60	Clay loam	CH, ML, MH, CL	A-6, A-7	0	100	100	90-100	70-100	35-55	10-30
Ko: Kolls	0-16	Clay	CH, MH	A-7	0	100	100	95-100	85-100	50-90	25-50
	16-39	Clay	CH, MH	A-7	0	100	100	95-100	85-100	60-90	25-55
	39-60	Clay	CH, MH	A-7	0	100	100	95-100	85-100	60-90	25-55
Lc: Lawet	0-13	Loam	CL, CL-ML	A-6, A-4	0	100	100	85-100	50-75	20-40	5-15
	13-60	Sandy clay loam, clay loam, silty clay loam.	CL, SC	A-6, A-4	0	100	100	70-100	35-75	20-35	8-20
Ma: Macken	0-4	Silty clay loam	CH, MH	A-7	0	100	100	95-100	85-100	50-75	20-45
	4-34	Silty clay, clay	CH, MH	A-7	0	100	100	95-100	85-100	50-80	20-45
	34-60	Silty clay, silty clay loam, clay.	CH, MH	A-7	0	100	100	95-100	85-100	50-80	20-45
Mb: Macken	0-4	Silty clay loam	CH, CL	A-7, A-6	0	100	100	95-100	85-100	35-55	20-40
	4-34	Silty clay, clay	CH, MH	A-7	0	100	100	95-100	85-100	50-70	20-40
	34-60	Silty clay, clay, silty clay loam.	CH, CL	A-7, A-6	0	100	100	95-100	85-100	35-60	20-45
OaA: Oahe	0-7	Loam	ML, CL	A-4, A-6, A-7	0	90-100	85-100	60-95	50-80	30-45	5-20
	7-23	Loam, clay loam	CL, ML	A-4, A-6, A-7	0	80-100	80-100	60-95	50-75	30-45	5-20
	23-33	Loam, sandy loam	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6, A-7	0	80-95	70-95	50-95	30-75	20-45	5-20
	33-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SW, SM, GW, SC-SM	A-1, A-2, A-3	0	30-85	30-75	10-60	0-30	15-25	NP-7

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
OdA*:											
Oahe	0-7	Loam	ML, CL	A-4, A-6, A-7	0	90-100	85-100	60-95	50-80	30-45	5-20
	7-23	Loam, clay loam	CL, ML	A-4, A-6, A-7	0	80-100	80-100	60-95	50-75	30-45	5-20
	23-33	Loam, sandy loam	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6, A-7	0	80-95	70-95	50-95	30-75	20-45	5-20
	33-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SW, SM, GW, SC-SM	A-1, A-2, A-3	0	30-85	30-75	10-60	0-30	15-25	NP-7
Delmont	0-5	Loam	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	5-17	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SC-SM	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	17-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SM, SW-SM, SC-SM, SW,	A-1, A-2	0-5	60-100	40-80	15-50	3-30	15-25	NP-5
OkB, OkC, OkD	0-4	Clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	70-95	35-50	12-25
Oko	4-10	Clay loam, clay	CL, CH	A-7	0-5	95-100	90-100	75-100	65-95	40-65	15-35
	10-41	Clay	CH	A 7	0-5	95-100	90-100	75-100	65-95	50-70	25-40
	41-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
OnA	0-15	Silt loam	ML, CL	A-4, A-6, A-7-6	0	100	95-100	90-100	70-100	30-45	5-20
Onita	15-33	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	75-100	40-60	10-30
	33-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
Os*:											
Onita	0-15	Silt loam	CL, ML	A-4, A-6, A-7	0	100	95-100	90-100	70-100	30-45	7-20
	15-33	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	75-100	40-60	10-30
	33-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
Hoven	0-3	Silt loam	ML, CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	75-95	27-45	5-20
	3-7	Silty clay, clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	7-25	Silty clay, clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	25-60	Silty clay, clay, clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	80-100	60-100	35-75	11-45
OtB, OtC	0-5	Clay	CH, MH	A-7	0-2	100	100	90-100	80-100	60-80	25-45
Opal	5-19	Clay	CH, MH	A-7	0-2	100	100	90-100	80-100	65-85	30-50
	19-28	Clay	CH, MH	A-7	0-2	100	95-100	90-100	80-100	65-85	30-50
	28-60	Weathered bedrock	---	---	---	---	---	---	---	60-95	25-60

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
OuD*:											
Opal	0-5	Clay	CH, MH	A-7	0-2	100	100	90-100	80-100	60-80	25-45
	5-19	Clay	CH, MH	A-7	0-2	100	100	90-100	80-100	65-85	30-50
	19-28	Clay	CH, MH	A-7	0-2	100	95-100	90-100	80-100	65-85	30-50
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sansarc	0-4	Clay	CH, MH	A-7	0	100	95-100	90-100	75-100	60-90	25-55
	4-18	Clay	CH, MH	A-7	0	95-100	95-100	95-100	85-100	60-90	25-55
	18-60	Weathered bedrock	CH, MH	A-7	0	100	95-100	90-100	85-100	50-90	20-55
Ow: Orthents, gravelly	0-4	Gravelly loam	SM, GM	A-4, A-2	0-5	60-90	50-80	45-70	25-50	20-35	NP-7
	4-60	Gravelly loamy sand, gravelly sand, very gravelly sand.	SW, SW-SM, SM	A-1	0-10	60-85	45-70	15-45	0-15	15-25	NP-5
OxD*:											
Orton	0-4	Loam	ML, CL	A-4, A-6	0	95-100	85-100	75-90	55-75	30-40	5-15
	4-12	Fine sandy loam, loam.	SM, ML, SC-SM, CL-ML	A-4	0	95-100	85-100	70-95	35-75	18-35	NP-10
	12-26	Fine sandy loam, loam, sandy loam.	SM, ML, SC-SM, CL-ML	A-4	0	95-100	85-95	60-90	35-75	18-35	NP-10
	26-60	Gravelly sand, very gravelly sand.	GW, GM, SW, SM	A-1, A-2	0-5	30-60	25-60	15-40	0-30	15-25	NP-5
Talmo	0-7	Loam, gravelly loam.	ML, CL	A-4, A-6	0-5	95-100	90-100	85-100	55-75	25-40	5-15
	7-60	Extremely gravelly sand, very gravelly sand, very gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	20-65	15-35	0-35	15-25	NP-5
PgD*:											
Peno	0-5	Loam	ML, CL	A-6, A-7, A-4	0-5	95-100	95-100	85-95	60-75	30-45	5-20
	5-9	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	85-95	70-85	40-65	15-35
	9-60	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	85-95	70-85	45-80	20-45
Gettys	0-3	Clay loam	CL, CH	A-7	0	95-100	90-100	85-100	70-85	40-60	15-30
	3-24	Clay loam, clay	CL, CH	A-7	0	95-100	90-100	85-100	60-80	40-60	15-30
	24-60	Clay loam, clay	CL, CH, MH, ML	A-7	0	95-100	90-100	85-100	60-80	40-60	10-30
Pk: Plankinton	0-8	Silt loam	ML, CL	A-4, A-6	0	100	100	90-100	80-100	27-40	5-15
	8-29	Clay, silty clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	90-100	70-100	40-70	15-35
	29-60	Silty clay, clay loam, silty clay loam.	CH, CL	A-6, A-7	0	95-100	90-100	85-100	65-100	30-60	15-30
PrA, PrB: Promise	0-8	Silty clay	CH, MH	A-7	0	100	100	90-100	80-100	55-90	25-55
	8-43	Clay	CH, MH	A-7	0	100	100	90-100	85-100	60-85	25-50
	43-60	Clay, silty clay, silty clay loam.	CH, MH, CL	A-7, A-6	0	100	100	90-100	85-100	50-90	25-55

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Ps--------------- Prosper	0-13	Loam-------------	CL	A-4, A-6	0	95-100	95-100	80-100	50-90	28-35	9-15
	13-28	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	28-36	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	36-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
RaA, RaB--------- Raber	0-5	Loam-------------	CL	A-6	0	100	100	85 95	60-75	30-40	10-20
	5-17	Clay loam, clay	CL, CH	A-6, A-7	0	100	100	90-100	70-95	35-60	11-35
	17-60	Clay loam, clay	CL, CH	A-6, A-7	0	100	100	90-100	70-90	30-60	11-35
RcA*, RcB*:											
Raber-----------	0-5	Loam-------------	CL	A-6	0	100	100	85-95	60-75	30-40	10-20
	5-17	Clay loam, clay	CL, CH	A-6, A-7	0	100	100	90-100	70-95	35-60	11-35
	17-60	Clay loam, clay	CL, CH	A-6, A-7	0	100	100	90-100	70-90	30-60	11-35
Cavo------------	0-7	Loam-------------	CL, CL-ML	A-4, A-6	0	100	95 100	85 100	60-85	25-40	5-20
	7-18	Clay loam, clay	CL, CH	A-7	0	100	95-100	90-100	70-95	40-65	15-35
	18 60	Clay loam, clay	CL, CH	A-7, A-6	0-5	95-100	95-100	85-100	60-95	36-55	15-30
RpB*, RpC*:											
Raber-----------	0-5	Loam-------------	CL	A-6	0	100	100	85-95	60-75	30-40	10-20
	5-17	Clay loam, clay	CL, CH	A-6, A-7	0	100	100	90-100	70-95	35-60	11-35
	17-60	Clay loam, clay	CL, CH	A-6, A-7	0	100	100	90-100	70-90	30-60	11-35
Peno------------	0-5	Loam-------------	ML, CL	A-6, A-7, A-4	0-5	95-100	95-100	85-95	60-75	30-45	5-20
	5-9	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	85-95	70-85	40-65	15-35
	9-60	Clay loam, clay	CL, CH	A-7	0 5	95-100	95-100	85-95	70-85	45-80	20-45
RrA-------------- Ree	0-4	Loam --------	CL, ML, CL-ML	A-4, A-6, A-7	0	95-100	90-100	80-100	70-95	24-45	3-20
	4-43	Clay loam, sandy clay loam, silty clay loam.	CL	A-6, A-7	0	95-100	90-100	70-100	65-85	30-45	10-20
	43-60	Stratified fine sandy loam to clay loam.	CL, CL-ML, SC-SM, SC	A-4, A-6, A-7	0	95-100	85-100	70-100	35-85	25-45	5-22
RsF*:											
Rock outcrop----	0-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sansarc---------	0-4	Clay ----------	CH, MH	A-7	0	100	95-100	90-100	75-100	60-90	25-55
	4-18	Clay-------------	CH, MH	A-7	0	95-100	95-100	95-100	85-100	60-90	25-55
	18 60	Weathered bedrock	---	---	---	---	---	---	---	---	---
SbF*:											
Sansarc---------	0 4	Clay-------------	CH, MH	A-7	0	100	95-100	90-100	75-100	60-90	25-55
	4-18	Clay-------------	CH, MH	A-7	0	95-100	95-100	95-100	85-100	60-90	25-55
	18-60	Weathered bedrock	CH, MH	A-7	0	100	95-100	90-100	85-100	50-90	20-55
Opal------------	0-5	Clay-------------	CH, MH	A-7	0-2	100	100	90-100	80-100	60-80	25-45
	5-19	Clay-------------	CH, MH	A-7	0-2	100	100	90-100	80-100	65-85	30-50
	19-28	Clay-------------	CH, MH	A-7	0-2	100	95-100	90-100	80-100	65-85	30-50
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
StA*:											
Stickney--------	0-6	Loam------------	CL	A-4, A-6	0	95-100	95-100	85-100	60-85	28-35	9-15
	6-32	Clay loam, silty clay loam, silty clay.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-95	40-60	14-34
	32-60	Clay loam, loam	CL, CH, MH, ML	A-6, A-7	0-5	95-100	90-100	80-100	55-90	35-60	10-35

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
StA*:											
Java	0-4	Loam	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25
SvA*:											
Stickney	0-6	Loam	CL	A-4, A-6	0	95-100	95-100	85-100	60-85	28-35	9-15
	6-32	Clay loam, silty clay loam, silty clay.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-95	40-60	14-34
	32-60	Clay loam, loam	CL, CH, MH, ML	A-6, A-7	0-5	95-100	90-100	80-100	55-90	35-60	10-35
Java	0-4	Loam	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25
Hoven	0-3	Silt loam	ML, CL, CL-ML	A-4, A 6, A-7	0	100	100	90-100	75-95	27-45	5-20
	3-7	Silty clay, clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	7-25	Silty clay, clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	95-100	80-100	45-80	20-40
	25-60	Silty clay, clay, clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	80-100	60-100	35-75	11-45
TaE: Talmo	0-7	Loam, gravelly loam.	ML, CL	A-4, A-6	0-5	95-100	90-100	85-100	55-75	25-40	5-15
	7-60	Extremely gravelly sand, very gravelly sand, very gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	20-65	15-35	0-35	15-25	NP-5
TbA: Talmo	0-7	Sandy loam, gravelly loam.	SM, SC-SM	A-4	0-5	95-100	90-100	85-100	40-50	15-25	NP-7
	7-60	Extremely gravelly sand, very gravelly sand, very gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	20-65	15-35	0-35	15-25	NP-5
TcF*:											
Talmo	0-7	Loam, gravelly loam.	ML, CL	A-4, A-6	10-50	95-100	90-100	85-100	55-75	25-40	5-15
	7-60	Gravelly sand, very gravelly sand, gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	5-25	40-95	30-65	15-35	0-35	0-25	NP-5
Java	0-4	Loam	ML, CL	A-4, A-6, A-7	0	95-100	95-100	80-95	60-85	30-45	5-20
	4-9	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-85	30-45	10-20
	9-30	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	80-95	60-85	30-45	10-20
	30-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	85-100	75-95	60-85	30-45	10-25

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
TdD*:											
Talmo-----------	0-7	Loam, gravelly loam.	ML, CL	A-4, A-6	0-5	95-100	90-100	85-100	55-75	25-40	5-15
	7-60	Extremely gravelly sand, very gravelly sand, very gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	20-65	15-35	0-35	15-25	NP-5
Delmont---------	0-5	Loam------------	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	5-17	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SC-SM	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	17-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SM, SW-SM, SC-SM, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	15-25	NP-5
Te--------------- Tetonka	0-10	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	8-20
	10-40	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	40-60	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
Wd--------------- Wendte	0-5	Silty clay-------	CH, MH	A-7	0	100	100	90-100	80-100	50-80	20-50
	5-60	Stratified clay loam to clay.	CH, MH	A-7	0	100	100	90-100	70-100	50-80	20-50

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
BdA*:												
Bend	0-8	20-27	1.20-1.30	0.6-2.0	0.17-0.22	6.1-7.8	0-2	Low	0.28	5	6	2-4
	8-13	18-30	1.15-1.30	0.6-2.0	0.17-0.20	6.6-7.8	0-2	Moderate	0.43			
	13-38	18-25	1.15-1.30	0.6-2.0	0.17-0.20	6.6-8.4	0-2	Low	0.43			
	38-60	10-35	1.20-1.35	0.06-2.0	0.17-0.20	7.4-9.0	2-8	Low	0.43			
Edwin	0-9	10-18	1.10-1.25	0.6-2.0	0.19-0.22	6.6-8.4	0-4	Low	0.32	5	6	2-4
	9-27	15-18	1.15-1.30	0.6-2.0	0.17-0.20	7.4-8.4	0-4	Low	0.43			
	27-37	15-18	1.15-1.30	0.6-2.0	0.17-0.20	7.4-9.0	2-8	Low	0.43			
	37-60	10-20	1.20-1.35	0.06-2.0	0.17-0.20	7.4-9.0	4-8	Low	0.43			
BkE*, BkF*:												
Betts	0-2	18-27	1.20-1.30	0.6-2.0	0.16-0.18	6.6-8.4	0-2	Low	0.28	5	4L	1-3
	2-50	20-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.37			
	50-60	20-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
Java	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			
Bn Bon	0-12	20-27	1.20-1.30	0.6-2.0	0.19-0.22	6.6-8.4	0-2	Low	0.24	5	6	4-6
	12-27	15-30	1.25-1.40	0.6-2.0	0.13-0.17	7.4-8.4	0-2	Low	0.32			
	27-60	15-30	1.25-1.40	0.6-6.0	0.11-0.16	7.4-8.4	0-2	Low	0.32			
BuA Bullcreek	0-2	55-65	1.10-1.20	0.01-0.06	0.10-0.14	6.6-8.4	0-2	Very high	0.37	5	4	2-4
	2-8	60-70	1.10-1.25	0.01-0.06	0.10-0.14	7.4-9.0	0-4	Very high	0.37			
	8-13	60-70	1.15-1.30	0.01-0.06	0.08-0.12	7.4-9.0	4-16	Very high	0.37			
	13-60	60-70	1.25-1.40	0.01-0.06	0.08-0.12	7.4-9.0	4-16	Very high	0.37			
CcA*:												
Capa	0-2	15-25	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low	0.37	2	6	1-2
	2-15	60-70	1.25-1.40	0.01-0.06	0.10-0.14	6.6-8.4	4-16	Very high	0.37			
	15-60	45-65	1.25-1.45	0.01-0.06	0.08-0.12	7.9-8.4	4-16	Very high	0.37			
Carter	0-6	20-26	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low	0.37	5	6	2-4
	6-18	60-70	1.15-1.30	0.01-0.06	0.08-0.14	6.6-8.4	2-8	Very high	0.37			
	18-60	45-60	1.15-1.35	0.01-0.2	0.08-0.12	7.4-8.4	2-8	Very high	0.37			
ClA*:												
Capa	0-2	15-25	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low	0.37	2	6	1-2
	2-15	60-70	1.25-1.40	0.01-0.06	0.10-0.14	6.6-8.4	4-16	Very high	0.37			
	15-60	45-65	1.25-1.45	0.01-0.06	0.08-0.12	7.9-8.4	4-16	Very high	0.37			
Slickspots	0-60	50-80	1.20-1.30	0.01-0.06	0.08-0.12	8.5-9.0	>16	Very high	0.37	2	4	0-1
CpA*:												
Carter	0-6	20-26	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low	0.37	5	6	2-4
	6-18	60-70	1.15-1.30	0.01-0.06	0.08-0.14	6.6-8.4	2-8	Very high	0.37			
	18-60	45-60	1.15-1.35	0.01-0.2	0.08-0.12	7.4-8.4	2-8	Very high	0.37			
Promise	0-8	50-60	1.10-1.25	0.01-0.2	0.10-0.14	6.1-7.8	0-2	Very high	0.37	5	4	2-4
	8-43	60-65	1.10-1.25	0.01-0.2	0.08-0.14	7.4-9.0	0-2	Very high	0.37			
	43-60	35-65	1.10-1.25	0.01-0.2	0.10-0.16	7.4-9.0	2-4	Very high	0.37			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
CrA*:												
Cavo	0-7	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low	0.32	2	6	1-3
	7-18	35-50	1.25-1.35	0.01-0.2	0.10-0.15	7.4-8.4	2-8	High	0.37			
	18-60	27-42	1.30-1.55	0.06-0.6	0.08-0.14	7.9-9.0	4-16	Moderate	0.37			
Jerauld	0-5	15-25	1.10-1.25	0.6-2.0	0.18-0.22	5.6-7.3	0-4	Low	0.37	2	6	1-3
	5-10	35-60	1.15-1.30	0.01-0.2	0.10-0.15	6.6-8.4	2-8	High	0.37			
	10-60	27-45	1.35-1.60	0.06-0.2	0.08-0.13	7.4-9.0	4-16	High	0.32			
Cs*:												
Cavo	0-7	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low	0.32	2	6	1-3
	7-18	35-50	1.25-1.35	0.01-0.2	0.10-0.15	7.4-8.4	2-8	High	0.37			
	18-60	27-42	1.30-1.55	0.06-0.6	0.08-0.14	7.9-9.0	4-16	Moderate	0.37			
Stickney	0-6	20-27	1.15-1.30	0.6-2.0	0.18-0.20	5.6-7.8	0-2	Low	0.32	5	6	2-4
	6-32	35-45	1.20-1.35	0.06-0.2	0.16-0.19	6.1-7.8	4-16	High	0.37			
	32-60	20-35	1.50-1.70	0.06-0.6	0.14-0.18	7.4-9.0	4-16	Moderate	0.37			
Df*:												
DeGrey	0-8	18-25	1.00-1.20	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Low	0.37	2	6	2-4
	8-18	35-55	1.30-1.45	0.01-0.2	0.14-0.19	6.6-8.4	2-8	High	0.37			
	18-39	35-45	1.35-1.45	0.06-0.6	0.11-0.17	7.4-8.4	2-8	High	0.43			
	39-60	25-40	1.50-1.65	0.2-0.6	0.14-0.18	7.9-9.0	4-16	Moderate	0.37			
Walke	0-7	15-26	1.10-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Low	0.37	5	6	1-3
	7-33	35-50	1.20-1.35	0.06-0.6	0.11-0.19	6.6-8.4	0-4	High	0.37			
	33-60	30-45	1.35-1.60	0.06-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.43			
DnB*:												
Delmont	0-5	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.8	0-2	Low	0.28	3	6	2-4
	5-17	18-30	1.20-1.35	0.6-6.0	0.12-0.18	6.1-7.8	0-2	Low	0.28			
	17-60	0-5	1.60-1.75	6.0-60	0.03-0.06	7.4-8.4	0-2	Low	0.10			
Oahe	0-7	18-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low	0.28	4	6	2-4
	7-23	18-30	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Low	0.28			
	23-33	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Low	0.32			
	33-60	0-7	1.50-1.70	6.0-60	0.03-0.06	7.4-8.4	0-2	Low	0.10			
Du*:												
Durrstein	0-6	10-26	1.15-1.30	0.6-2.0	0.19-0.22	6.1-7.3	4-16	Low	0.37	2	6	1-3
	6-19	35-60	1.20-1.35	0.01-0.2	0.10-0.15	6.6-9.0	4-16	High	0.37			
	19-60	35-55	1.35-1.50	0.01-0.2	0.08-0.13	7.4-9.6	4-16	High	0.37			
Egas	0-4	40-50	1.15-1.30	0.06-0.2	0.10-0.15	7.4-9.0	8-16	High	0.28	5	4	2-4
	4-60	35-50	1.25-1.40	0.06-0.2	0.08-0.13	7.9-9.0	8-16	High	0.32			
EpC*:												
Eakin	0-7	20-26	1.10-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Low	0.32	5	6	2-4
	7-29	28-35	1.15-1.25	0.6-2.0	0.18-0.21	6.6-8.4	0-2	Moderate	0.43			
	29-60	25-45	1.50-1.70	0.2-0.6	0.16-0.20	7.4-9.0	0-4	Moderate	0.43			
Peno	0-5	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-7.3	0-2	Low	0.32	5	6	2-4
	5-9	35-45	1.30-1.45	0.06-0.6	0.13-0.19	6.6-7.8	0-2	High	0.28			
	9-60	35-45	1.50-1.70	0.06-0.6	0.11-0.17	7.4-9.0	2-8	High	0.32			
ErA*, ErB*:												
Eakin	0-7	20-26	1.10-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Low	0.32	5	6	2-4
	7-29	28-35	1.15-1.25	0.6-2.0	0.18-0.21	6.6-8.4	0-2	Moderate	0.43			
	29-60	25-45	1.50-1.70	0.2-0.6	0.16-0.20	7.4-9.0	0-4	Moderate	0.43			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
ErA*, ErB*:												
Raber----------	0-5	23-26	1.15-1.30	0.6-2.0	0.18-0.19	6.1-7.3	0-2	Low--------	0.32	5	6	2-4
	5-17	35-45	1.25-1.40	0.06-0.6	0.13-0.19	6.6-7.8	0-2	High-------	0.32			
	17-60	27-45	1.50-1.70	0.06-0.6	0.11-0.20	7.4-8.4	0-4	High-------	0.37			
GfF*:												
Gettys----------	0-3	30-40	1.25-1.35	0.2-0.6	0.16-0.19	6.6-8.4	0-2	High-------	0.28	5	4L	1-3
	3-24	35-50	1.35-1.50	0.06-0.6	0.12-0.17	7.4-8.4	0-2	High-------	0.28			
	24-60	30-50	1.50-1.70	0.06-0.6	0.11-0.17	7.4-8.4	0-4	High-------	0.28			
Sansarc---------	0-4	55-65	1.10-1.20	0.06-0.2	0.08-0.12	6.6-8.4	0-2	Very high	0.37	2	4	1-2
	4-18	55-65	1.10-1.20	0.06-0.2	0.06-0.12	7.4-8.4	0-2	Very high	0.37			
	18-60	---	---	---	---	---	---	-----------	----			
GmB*:												
Glenham---------	0-3	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low--------	0.28	5	6	2-4
	3-13	25-34	1.30-1.45	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28			
	13-60	20-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
Java------------	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			
GnA*:												
Glenham---------	0-3	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low--------	0.28	5	6	2-4
	3-13	25-34	1.30-1.45	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28			
	13-60	20-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
Java------------	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			
Cavo------------	0-7	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low--------	0.32	2	6	1-3
	7-18	35-50	1.25-1.35	0.01-0.2	0.10-0.15	7.4-8.4	2-8	High-------	0.37			
	18-60	27-42	1.30-1.55	0.06-0.6	0.08-0.14	7.9-9.0	4-16	Moderate	0.37			
GrA*:												
Glenham---------	0-3	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low--------	0.28	5	6	2-4
	3-13	25-34	1.30-1.45	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28			
	13-60	20-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
Prosper---------	0-13	18-26	1.15-1.25	0.6-2.0	0.17-0.19	5.6-7.8	0-0	Low--------	0.24	5	6	4-6
	13-28	27-35	1.20-1.30	0.6-2.0	0.19-0.22	6.6-7.8	0-0	Moderate	0.28			
	28-36	20-30	1.30-1.60	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.28			
	36-60	20-30	1.45-1.65	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
GrB*:												
Glenham---------	0-3	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low--------	0.28	5	6	2-4
	3-13	25-34	1.30-1.45	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28			
	13-60	20-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
Prosper---------	0-13	20-26	1.15-1.25	0.6-2.0	0.17-0.19	6.1-7.8	0-2	Low--------	0.24	5	6	4-6
	13-28	27-35	1.20-1.30	0.6-2.0	0.19-0.22	6.6-7.8	0-2	Moderate	0.28			
	28-36	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.32			
	36-60	20-30	1.45-1.65	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
GsA*:												
Glenham	0-3	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low	0.28	5	6	2-4
	3-13	25-34	1.30-1.45	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28			
	13-60	20-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
Prosper	0-13	18-26	1.15-1.25	0.6-2.0	0.17-0.19	5.6-7.8	0-0	Low	0.24	5	6	4-6
	13-28	27-35	1.20-1.30	0.6-2.0	0.19-0.22	6.6-7.8	0-0	Moderate	0.28			
	28-36	20-30	1.30-1.60	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.28			
	36-60	20-30	1.45-1.65	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
Hoven	0-3	22-26	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low	0.37	2	6	2-4
	3-7	35-60	1.15-1.30	0.01-0.06	0.10-0.19	6.1-7.8	4-16	High	0.37			
	7-25	35-60	1.15-1.30	0.01-0.06	0.10-0.19	6.6-8.4	4-16	High	0.37			
	25-60	35-60	1.30-1.50	0.01-0.2	0.08-0.17	7.4-9.0	4-16	High	0.37			
GtB*:												
Glenham	0-3	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low	0.28	5	6	2-4
	3-13	25-34	1.30-1.45	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28			
	13-60	20-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
Prosper	0-13	20-26	1.15-1.25	0.6-2.0	0.17-0.19	6.1-7.8	0-2	Low	0.24	5	6	4-6
	13-28	27-35	1.20-1.30	0.6-2.0	0.19-0.22	6.6-7.8	0-2	Moderate	0.28			
	28-36	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.32			
	36-60	20-30	1.45-1.65	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
Java	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			
GuA*:												
Glenham	0-3	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low	0.28	5	6	2-4
	3-13	25-34	1.30-1.45	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28			
	13-60	20-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
Stickney	0-6	20-27	1.15-1.30	0.6-2.0	0.18-0.20	5.6-7.8	0-2	Low	0.32	5	6	2-4
	6-32	35-45	1.20-1.35	0.06-0.2	0.16-0.19	6.1-7.8	4-16	High	0.37			
	32-60	20-35	1.50-1.70	0.06-0.6	0.14-0.18	7.4-9.0	4-16	Moderate	0.37			
Hoven	0-3	22-26	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low	0.37	2	6	2-4
	3-7	35-60	1.15-1.30	0.01-0.06	0.10-0.19	6.1-7.8	4-16	High	0.37			
	7-25	35-60	1.15-1.30	0.01-0.06	0.10-0.19	6.6-8.4	4-16	High	0.37			
	25-60	35-60	1.30-1.50	0.01-0.2	0.08-0.17	7.4-9.0	4-16	High	0.37			
HaA*:												
Henkin	0-18	10-20	1.25-1.35	2.0-6.0	0.11-0.17	5.6-7.3	0-2	Low	0.20	5	3	1-3
	18-27	7-18	1.20-1.45	2.0-6.0	0.09-0.18	5.6-7.8	0-2	Low	0.20			
	27-60	3-27	1.35-1.65	0.6-6.0	0.08-0.16	6.1-8.4	0-2	Low	0.24			
Blendon	0-16	10-18	1.25-1.35	2.0-6.0	0.11-0.17	5.6-7.3	0-2	Low	0.20	5	3	2-4
	16-40	10-20	1.20-1.30	0.6-6.0	0.11-0.18	6.1-7.3	0-2	Low	0.20			
	40-48	10-15	1.25-1.35	2.0-6.0	0.09-0.15	6.1-8.4	0-2	Low	0.24			
	48-60	5-18	1.30-1.45	2.0-20	0.08-0.15	6.6-8.4	0-2	Low	0.24			
HdA*, HdB*:												
Highmore	0-7	20-26	1.10-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Low	0.32	5	6	2-4
	7-24	25-35	1.40-1.50	0.6-2.0	0.18-0.21	6.6-8.4	0-2	Moderate	0.43			
	24-60	20-34	1.40-1.50	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Low	0.43			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
HdA*, HdB*:												
DeGrey----------	0-8	18-25	1.00-1.20	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Low--------	0.37	2	6	2-4
	8-18	35-55	1.30-1.45	0.01-0.2	0.14-0.19	6.6-8.4	2-8	High-------	0.37			
	18-39	35-45	1.35-1.45	0.06-0.6	0.11-0.17	7.4-8.4	2-8	High-------	0.43			
	39-60	25-40	1.50-1.65	0.2-0.6	0.14-0.18	7.9-9.0	4-16	Moderate	0.37			
HeA*, HeB*:												
Highmore--------	0-7	20-26	1.10-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Low--------	0.32	5	6	2-4
	7-24	25-35	1.40-1.50	0.6-2.0	0.18-0.21	6.6-8.4	0-2	Moderate	0.43			
	24-60	20-34	1.40-1.50	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Low--------	0.43			
Eakin-----------	0-7	20-26	1.10-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Low--------	0.32	5	6	2-4
	7-29	28-35	1.15-1.25	0.6-2.0	0.18-0.21	6.6-8.4	0-2	Moderate	0.43			
	29-60	25-45	1.50-1.70	0.2-0.6	0.16-0.20	7.4-9.0	0-4	Moderate	0.43			
Ho-------------- Hoven	0-3	22-26	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low--------	0.37	2	6	2-4
	3-7	35-60	1.15-1.30	0.01-0.06	0.10-0.19	6.1-7.8	4-16	High-------	0.37			
	7-25	35-60	1.15-1.30	0.01-0.06	0.10-0.19	6.6-8.4	4-16	High-------	0.37			
	25-60	35-60	1.30-1.50	0.01-0.2	0.08-0.17	7.4-9.0	4-16	High-------	0.37			
HuB------------- Hurley	0-2	20-26	1.10-1.20	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Low--------	0.37	2	6	1-2
	2-30	60-70	1.30-1.45	0.01-0.06	0.05-0.13	7.4-9.0	4-16	Very high	0.37			
	30-60	---	---	---	---	---	---	-----------	----			
JaC*:												
Java------------	0-4	18-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-7.8	0-0	Low--------	0.20	5	8	1-3
	4-9	18-35	1.25-1.45	0.2-2.0	0.14-0.18	6.6-7.8	0-0	Moderate	0.32			
	9-30	18-35	1.30-1.50	0.2-0.6	0.14-0.18	7.4-7.8	0-2	Moderate	0.37			
	30-60	18-35	1.30-1.50	0.2-0.6	0.14-0.18	7.4-7.8	0-4	Moderate	0.37			
Glenham---------	0-3	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low--------	0.28	5	6	2-4
	3-13	25-34	1.30-1.45	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28			
	13-60	20-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
Prosper---------	0-13	20-26	1.15-1.25	0.6-2.0	0.17-0.19	6.1-7.8	0-2	Low--------	0.24	5	6	4-6
	13-28	27-35	1.20-1.30	0.6-2.0	0.19-0.22	6.6-7.8	0-2	Moderate	0.28			
	28-36	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.32			
	36-60	20-30	1.45-1.65	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
JbD*:												
Java------------	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			
Betts-----------	0-2	18-27	1.20-1.30	0.6-2.0	0.16-0.18	6.6-8.4	0-2	Low--------	0.28	5	4L	1-3
	2-50	20-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.37			
	50-60	20-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
JcD*:												
Java------------	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			
Betts-----------	0-2	18-27	1.20-1.30	0.6-2.0	0.16-0.18	6.6-8.4	0-0	Low--------	0.20	5	8	2-4
	2-50	20-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-0	Moderate	0.28			
	50-60	20-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.28			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
JgB*, JgC*:												
Java-----------	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			
Glenham---------	0-3	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low-------	0.28	5	6	2-4
	3-13	25-34	1.30-1.45	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28			
	13-60	20-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
JhC*:												
Java-----------	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			
Glenham---------	0-3	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low-------	0.28	5	6	2-4
	3-13	25-34	1.30-1.45	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28			
	13-60	20-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
Prosper---------	0-13	20-26	1.15-1.25	0.6-2.0	0.17-0.19	6.1-7.8	0-2	Low-------	0.24	5	6	4-6
	13-28	27-35	1.20-1.30	0.6-2.0	0.19-0.22	6.6-7.8	0-2	Moderate	0.28			
	28-36	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.32			
	36-60	20-30	1.45-1.65	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
JsA*:												
Jerauld---------	0-5	15-25	1.10-1.25	0.6-2.0	0.18-0.22	5.6-7.3	0-4	Low-------	0.37	2	6	1-3
	5-10	35-60	1.15-1.30	0.01-0.2	0.10-0.15	6.6-8.4	2-8	High---	0.37			
	10-60	27-45	1.35-1.60	0.06-0.2	0.08-0.13	7.4-9.0	4-16	High---	0.32			
Slickspots------	0-60	27-40	1.30-1.40	0.06-0.2	0.14-0.16	8.5-9.0	>16	Moderate	0.37	2	6	0-1
Ko-------------- Kolls	0-16	45-60	1.20-1.30	0.01-0.06	0.10-0.14	6.6-8.4	0-2	Very high	0.37	5	4	2-4
	16-39	60-70	1.20-1.30	0.01-0.06	0.08-0.12	7.4-8.4	0-2	Very high	0.37			
	39-60	60-70	1.35-1.50	0.01-0.06	0.08-0.12	7.4-9.0	0-2	Very high	0.37			
Lc-------------- Lawet	0-13	15-27	1.30-1.50	0.6-2.0	0.20-0.24	7.4-8.4	0-0	Low-------	0.24	5	4L	3-6
	13-60	22-35	1.30-1.50	0.2-2.0	0.14-0.19	7.4-9.0	0-0	Moderate	0.28			
Ma-------------- Macken	0-4	30-40	1.15-1.25	0.2-0.6	0.19-0.22	6.1-7.3	0-2	High------	0.37	5	4	3-6
	4-34	40-50	1.15-1.40	0.06-0.2	0.10-0.18	6.6-8.4	0-2	High------	0.28			
	34-60	35-60	1.15-1.40	0.06-0.2	0.08-0.17	7.4-8.4	0-2	High------	0.37			
Mb-------------- Macken	0-4	30-45	1.20-1.30	0.2-0.6	0.19-0.22	6.1-7.3	0-2	High------	0.37	5	8	1-6
	4-34	40-60	1.20-1.50	0.06-0.2	0.10-0.18	6.6-8.4	0-2	High------	0.37			
	34-60	35-60	1.20-1.50	0.06-0.2	0.08-0.17	7.4-8.4	0-2	High------	0.37			
OaA------------- Oahe	0-7	18-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low-------	0.28	4	6	2-4
	7-23	18-30	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Low-------	0.28			
	23-33	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Low-------	0.32			
	33-60	0-7	1.50-1.70	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
OdA*:												
Oahe-----------	0-7	18-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low-------	0.28	4	6	2-4
	7-23	18-30	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Low---	0.28			
	23-33	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Low-------	0.32			
	33-60	0-7	1.50-1.70	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
Delmont---------	0-5	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.8	0-2	Low-------	0.28	3	6	2-4
	5-17	18-30	1.20-1.35	0.6-6.0	0.12-0.18	6.1-7.8	0-2	Low-------	0.28			
	17-60	0-5	1.60-1.75	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
OkB, OkC, OkD---- Oko	0-4	27-40	1.25-1.35	0.2-0.6	0.19-0.22	6.6-7.3	0-2	Moderate	0.32	5	6	2-4
	4-10	35-55	1.30-1.45	0.06-0.2	0.11-0.17	6.6-8.4	0-2	High------	0.37			
	10-41	40-60	1.45-1.70	0.06-0.2	0.08-0.12	7.4-8.4	0-8	High------	0.37			
	41-60	---	---	---	---	---	---	----------	----			
OnA-------------- Onita	0-15	20-26	1.15-1.30	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low-------	0.28	5	6	4-6
	15-33	35-50	1.20-1.40	0.2-0.6	0.11-0.17	6.1-7.3	0-2	High------	0.28			
	33-60	25-40	1.25-1.40	0.2-0.6	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
Os*:												
Onita-----------	0-15	20-26	1.15-1.30	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low-------	0.28	5	6	4-6
	15-33	35-50	1.20-1.40	0.2-0.6	0.16-0.19	6.1-7.3	0-2	High------	0.43			
	33-60	25-35	1.25-1.40	0.2-0.6	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
Hoven-----------	0-3	22-26	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low-------	0.37	2	6	2-4
	3-7	35-60	1.15-1.30	0.01-0.06	0.10-0.19	6.1-7.8	4-16	High------	0.37			
	7-25	35-60	1.15-1.30	0.01-0.06	0.10-0.19	6.6-8.4	4-16	High------	0.37			
	25-60	35-60	1.30-1.50	0.01-0.2	0.08-0.17	7.4-9.0	4-16	High------	0.37			
OtB, OtC--------- Opal	0-5	50-60	1.20-1.30	0.01-0.06	0.10-0.14	6.6-7.8	0-2	Very high	0.37	3	4	2-4
	5-19	50-60	1.20-1.30	0.01-0.06	0.08-0.14	6.6-8.4	0-2	Very high	0.37			
	19-28	50-60	1.20-1.30	0.01-0.06	0.08-0.12	6.6-8.4	2-4	Very high	0.37			
	28-60	---	---	---	---	---	---	----------	----			
OuD*:												
Opal------------	0-5	50-60	1.20-1.30	0.01-0.06	0.10-0.14	6.6-7.8	0-2	Very high	0.37	3	4	2-4
	5-19	50-60	1.20-1.30	0.01-0.06	0.08-0.14	6.6-8.4	0-2	Very high	0.37			
	19-28	50-60	1.20-1.30	0.01-0.06	0.08-0.12	6.6-8.4	2-4	Very high	0.37			
	28-60	---	---	---	---	---	---	----------	----			
Sansarc---------	0-4	55-65	1.10-1.20	0.06-0.2	0.08-0.12	6.6-8.4	0-2	Very high	0.37	2	4	1-2
	4-18	55-65	1.10-1.20	0.06-0.2	0.06-0.12	7.4-8.4	0-2	Very high	0.37			
	18-60	---	---	---	---	---	---	---------	----			
Ow--------------- Orthents, gravelly	0-4	10-20	1.25-1.40	2.0-6.0	0.11-0.20	6.1-7.8	0-2	Low-------	0.20	3	5	.5-3
	4-60	0-5	1.60-1.80	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
OxD*:												
Orton-----------	0-4	15-20	1.25-1.40	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low-------	0.28	4	5	2-4
	4-12	10-20	1.25-1.50	0.6-6.0	0.14-0.20	6.6-7.8	0-2	Low-------	0.20			
	12-26	10-18	1.30-1.50	2.0-6.0	0.12-0.17	7.4-8.4	0-2	Low-------	0.24			
	26-60	0-7	1.50-1.70	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
Talmo-----------	0-7	18-25	1.20-1.30	0.6-2.0	0.16-0.20	6.6-7.8	0-0	Low-------	0.28	2	6	2-4
	7-60	0-10	1.45-1.65	6.0-60	0.03-0.06	7.4-8.4	0-0	Low-------	0.05			
PgD*:												
Peno------------	0-5	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-7.3	0-2	Low-------	0.32	5	6	2-4
	5-9	35-45	1.30-1.45	0.06-0.6	0.13-0.19	6.6-7.8	0-2	High------	0.28			
	9-60	35-45	1.50-1.70	0.06-0.6	0.11-0.17	7.4-9.0	2-8	High------	0.32			
Gettys----------	0-3	30-40	1.25-1.35	0.2-0.6	0.16-0.19	6.6-8.4	0-2	High------	0.28	5	4L	1-3
	3-24	35-50	1.35-1.50	0.06-0.6	0.12-0.17	7.4-8.4	0-2	High------	0.28			
	24-60	30-50	1.50-1.70	0.06-0.6	0.11-0.17	7.4-8.4	0-4	High------	0.28			
Pk--------------- Plankinton	0-8	15-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low-------	0.37	3	6	3-6
	8-29	38-60	1.20-1.35	0.01-0.2	0.10-0.22	6.1-8.4	0-2	High------	0.37			
	29-60	35-60	1.35-1.50	0.06-0.6	0.08-0.17	6.6-8.4	2-8	High------	0.37			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
PrA, PrB: Promise	0-8	50-60	1.10-1.25	0.01-0.2	0.10-0.14	6.1-7.8	0-2	Very high	0.37	5	4	2-4
	8-43	60-65	1.10-1.25	0.01-0.2	0.08-0.14	7.4-9.0	0-2	Very high	0.37			
	43-60	35-65	1.10-1.25	0.01-0.2	0.10-0.16	7.4-9.0	2-4	Very high	0.37			
Ps: Prosper	0-13	18-26	1.15-1.25	0.6-2.0	0.17-0.19	5.6-7.8	0-0	Low	0.24	5	6	4-6
	13-28	27-35	1.20-1.30	0.6-2.0	0.19-0.22	6.6-7.8	0-0	Moderate	0.28			
	28-36	20-30	1.30-1.60	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.28			
	36-60	20-30	1.45-1.65	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
RaA, RaB: Raber	0-5	23-26	1.15-1.30	0.6-2.0	0.18-0.19	6.1-7.3	0-2	Low	0.32	5	6	2-4
	5-17	35-45	1.25-1.40	0.06-0.6	0.13-0.19	6.6-7.8	0-2	High	0.32			
	17-60	27-45	1.50-1.70	0.06-0.6	0.11-0.20	7.4-8.4	0-4	High	0.37			
RcA*, RcB*: Raber	0-5	23-26	1.15-1.30	0.6-2.0	0.18-0.19	6.1-7.3	0-2	Low	0.32	5	6	2-4
	5-17	35-45	1.25-1.40	0.06-0.6	0.13-0.19	6.6-7.8	0-2	High	0.32			
	17-60	27-45	1.50-1.70	0.06-0.6	0.11-0.20	7.4-8.4	0-4	High	0.37			
Cavo	0-7	20-26	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.3	0-2	Low	0.32	2	6	1-3
	7-18	35-50	1.25-1.35	0.01-0.2	0.10-0.15	7.4-8.4	2-8	High	0.37			
	18-60	27-42	1.30-1.55	0.06-0.6	0.08-0.14	7.9-9.0	4-16	Moderate	0.37			
RpB*, RpC*: Raber	0-5	23-26	1.15-1.30	0.6-2.0	0.18-0.19	6.1-7.3	0-2	Low	0.32	5	6	2-4
	5-17	35-45	1.25-1.40	0.06-0.6	0.13-0.19	6.6-7.8	0-2	High	0.32			
	17-60	27-45	1.50-1.70	0.06-0.6	0.11-0.20	7.4-8.4	0-4	High	0.37			
Peno	0-5	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-7.3	0-2	Low	0.32	5	6	2-4
	5-9	35-45	1.30-1.45	0.06-0.6	0.13-0.19	6.6-7.8	0-2	High	0.28			
	9-60	35-45	1.50-1.70	0.06-0.6	0.11-0.17	7.4-9.0	2-8	High	0.32			
RrA: Ree	0-4	22-26	1.15-1.30	0.6-2.0	0.18-0.22	6.1-7.3	0-2	Low	0.28	5	6	2-4
	4-43	27-35	1.20-1.35	0.6-2.0	0.17-0.22	6.6-8.4	0-2	Moderate	0.28			
	43-60	15-35	1.30-1.50	0.6-2.0	0.09-0.20	7.4-8.4	0-2	Low	0.28			
RsF*: Rock outcrop	0-60	---	---	---	---	---	---	---	---			
Sansarc	0-4	55-65	1.10-1.20	0.06-0.2	0.08-0.12	6.6-8.4	0-2	Very high	0.37	2	4	1-2
	4-18	55-65	1.10-1.20	0.06-0.2	0.06-0.12	7.4-8.4	0-2	Very high	0.37			
	18-60	---	---	---	---	---	---	---	---			
SbF*: Sansarc	0-4	55-65	1.10-1.20	0.06-0.2	0.08-0.12	6.6-8.4	0-2	Very high	0.37	2	4	1-2
	4-18	55-65	1.10-1.20	0.06-0.2	0.06-0.12	7.4-8.4	0-2	Very high	0.37			
	18-60	---	---	---	---	---	---	---	---			
Opal	0-5	50-60	1.20-1.30	0.01-0.06	0.10-0.14	6.6-7.8	0-2	Very high	0.37	3	4	2-4
	5-19	50-60	1.20-1.30	0.01-0.06	0.08-0.14	6.6-8.4	0-2	Very high	0.37			
	19-28	50-60	1.20-1.30	0.01-0.06	0.08-0.12	6.6-8.4	2-4	Very high	0.37			
	28-60	---	---	---	---	---	---	---	---			
StA*: Stickney	0-6	20-27	1.15-1.30	0.6-2.0	0.18-0.20	5.6-7.8	0-2	Low	0.32	5	6	2-4
	6-32	35-45	1.20-1.35	0.06-0.2	0.16-0.19	6.1-7.8	4-16	High	0.37			
	32-60	20-35	1.50-1.70	0.06-0.6	0.14-0.18	7.4-9.0	4-16	Moderate	0.37			
Java	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
SvA*:												
Stickney	0-6	20-27	1.15-1.30	0.6-2.0	0.18-0.20	5.6-7.8	0-2	Low	0.32	5	6	2-4
	6-32	35-45	1.20-1.35	0.06-0.2	0.16-0.19	6.1-7.8	4-16	High	0.37			
	32-60	20-35	1.50-1.70	0.06-0.6	0.14-0.18	7.4-9.0	4-16	Moderate	0.37			
Java	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			
Hoven	0-3	22-26	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Low	0.37	2	6	2-4
	3-7	35-60	1.15-1.30	0.01-0.06	0.10-0.19	6.1-7.8	4-16	High	0.37			
	7-25	35-60	1.15-1.30	0.01-0.06	0.10-0.19	6.6-8.4	4-16	High	0.37			
	25-60	35-60	1.30-1.50	0.01-0.2	0.08-0.17	7.4-9.0	4-16	High	0.37			
TaE Talmo	0-7	18-25	1.20-1.30	0.6-2.0	0.16-0.20	6.6-7.8	0-0	Low	0.28	2	6	2-4
	7-60	0-10	1.45-1.65	6.0-60	0.03-0.06	7.4-8.4	0-0	Low	0.05			
TbA Talmo	0-7	10-20	1.25-1.35	0.6-2.0	0.11-0.18	6.6-7.8	0-0	Low	0.20	2	3	1-2
	7-60	0-10	1.45-1.65	6.0-60	0.03-0.06	7.4-8.4	0-0	Low	0.05			
TcF*:												
Talmo	0-7	18-25	1.20-1.30	0.6-2.0	0.15-0.17	6.6-7.8	0-2	Low	0.20	2	8	2-4
	7-60	0-10	1.45-1.65	6.0-60	0.03-0.06	7.4-8.4	0-2	Low	0.10			
Java	0-4	20-29	1.20-1.30	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.28	5	6	1-3
	4-9	20-32	1.25-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Moderate	0.37			
	9-30	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.37			
	30-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	0-8	Moderate	0.37			
TdD*:												
Talmo	0-7	18-25	1.20-1.30	0.6-2.0	0.16-0.20	6.6-7.8	0-0	Low	0.28	2	6	2-4
	7-60	0-10	1.45-1.65	6.0-60	0.03-0.06	7.4-8.4	0-0	Low	0.05			
Delmont	0-5	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.8	0-2	Low	0.28	3	6	2-4
	5-17	18-30	1.20-1.35	0.6-6.0	0.12-0.18	6.1-7.8	0-2	Low	0.28			
	17-60	0-5	1.60-1.75	6.0-60	0.03-0.06	7.4-8.4	0-2	Low	0.10			
Te Tetonka	0-10	20-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.37	5	6	4-8
	10-40	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.1-7.8	0-2	High	0.28			
	40-60	30-50	1.35-1.50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High	0.32			
Wd Wendte	0-5	40-60	1.15-1.25	0.06-0.2	0.13-0.18	7.4-8.4	0-2	Very high	0.37	5	4	3-5
	5-60	45-55	1.20-1.40	0.06-0.2	0.11-0.17	7.4-8.4	0-2	Very high	0.37			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
BdA*:												
Bend	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Edwin	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
BkE*, BkF*:												
Betts	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Java	B	None	---	---	>6.0		---	>60	---	Moderate	High	Moderate.
Bn Bon	B	Occasional	Brief	Apr-Oct	3.0-5.0	Apparent	Oct-Jul	>60	---	High	Moderate	Low.
BuA Bullcreek	D	Rare	---	---	>6.0		---	>60	---	Low	High	High.
CcA*:												
Capa	D	None	---	---	3.5-5.0	Perched	Jan-Jun	>60	---	Low	High	Moderate.
Carter	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
ClA*:												
Capa	D	None	---	---	3.5-5.0	Perched	Jan-Jun	>60	---	Low	High	Moderate.
Slickspots	D	None	---	---	3.0-5.0	Apparent	Mar-Jun	>60	---	High	High	Moderate.
CpA*:												
Carter	D	None	---		>6.0	---	---	>60	---	Low	High	Moderate.
Promise	D	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
CrA*:												
Cavo	D	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Low	High	Moderate.
CrA*:												
Jerauld	D	None	---	---	3.5-5.0	Perched	Apr-Jun	>60	---	Low	High	Moderate.
Cs*:												
Cavo	D	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Low	High	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
Cs*:												
Stickney	C	None	---	---	3.5-5.0	Apparent	Mar-Jun	>60	---	Moderate	High	High.
Df*:												
DeGrey	D	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Low	High	Moderate.
Walke	C	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Low	High	Moderate.
DnB*:												
Delmont	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
Oahe	B	None		---	>6.0	---	---	>60	---	Low	Moderate	Low.
Du*:												
Durrstein	D	Occasional	Brief	Apr-Oct	0-1.5	Apparent	Oct-Jun	>60	---	Moderate	High	High.
Egas	D	Occasional	Brief	Apr-Oct	0-1.5	Apparent	Oct-Jun	>60	---	High	High	Moderate.
EpC*:												
Eakin	B	None	---	---	>6.0		---	>60	---	Moderate	High	Moderate.
Peno	C	None		---	>6.0	---	---	>60	---	Low	High	Moderate.
ErA*, ErB*:												
Eakin	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Raber	C	None		---	>6.0	---	---	>60	---	Low	High	Moderate.
GfF*:												
Gettys	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Sansarc	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Moderate.
GmB*:												
Glenham	B	None	---	---	>6.0		---	>60	---	Moderate	High	Moderate.
Java	B	None	---		>6.0	---	---	>60	---	Moderate	High	Moderate.
GnA*:												
Glenham	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Java	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Cavo	D	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Low	High	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
GrA*:												
Glenham	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Prosper	B	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	High	High	Moderate.
GrB*:												
Glenham	B	None	---	---	>6.0	---		>60	---	Moderate	High	Moderate.
Prosper	B	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Moderate	High	Moderate.
GsA*:												
Glenham	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Prosper	B	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	High	High	Moderate.
Hoven	D	None	---	---	+1-1.5	Perched	Mar-Jul	>60	---	Moderate	High	Moderate.
GtB*:												
Glenham	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Prosper	B	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Moderate	High	Moderate.
Java	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
GuA*:												
Glenham	B	None	---		>6.0	---	---	>60	---	Moderate	High	Moderate.
GuA*:												
Stickney	C	None		---	3.5-5.0	Apparent	Mar-Jun	>60	---	Moderate	High	High.
Hoven	D	None	---	---	+1-1.5	Perched	Mar-Jul	>60	---	Moderate	High	Moderate.
HaA*:												
Henkin	B	None	---	---	>6.0		---	>60	---	Moderate	Moderate	Low.
Blendon	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
HdA*, HdB*:												
Highmore	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
DeGrey	D	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Low	High	Moderate.
HeA*, HeB*:												
Highmore	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
HeA*, HeB*:												
Eakin	B	None	---	---	>6.0	---	---	>60	-	Moderate	High	Moderate.
Ho Hoven	D	None	---	---	+1-1.5	Perched	Mar-Jul	>60	-	Moderate	High	Moderate.
HuB Hurley	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.
JaC*:												
Java	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Glenham	B	None	---	---	>6.0		---	>60	---	Moderate	High	Moderate.
Prosper	B	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Moderate	High	Moderate.
JbD*, JcD*:												
Java	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Betts	B	None	---	-	>6.0	---	---	>60	---	Moderate	High	Moderate.
JgB*, JgC*:												
Java	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Glenham	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
JhC*:												
Java	B	None	---	--	>6.0	---	---	>60	---	Moderate	High	Moderate.
Glenham	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Prosper	B	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Moderate	High	Moderate.
JsA*:												
Jerauld	D	None	---	--	3.5-5.0	Perched	Apr-Jun	>60	-	Low	High	Moderate.
Slickspots	D	None	---	--	3.0-5.0	Apparent	Mar-Jun	>600		High	High	Moderate.
Ko Kolls	D	None	---	---	0-1.5	Perched	Apr-Jun	>60	--	Moderate	High	Moderate.
Lc Lawet	B/D	Rare	---	---	1.0-2.0	Apparent	Nov-Jun	>80	---	High	High	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
Ma----- Macken	D	None-----	---	---	+.5-1.0	Perched	Apr-Jul	>60	---	Moderate	High-----	Moderate.
Mb----- Macken	D	None-----		---	+3-1.0	Perched	Apr-Jul	>60	---	Moderate	High-----	Moderate.
OaA----- Oahe	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Moderate	Low.
OdA*:												
Oahe-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Moderate	Low.
Delmont-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Moderate	Low.
OkB, OkC, OkD----- Oko	D	None-----	---	---	>6.0	---	---	40-60	Soft	Low-----	High-----	Moderate.
OnA----- Onita	C	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Os*:												
Onita-----	C	None-----	---	---	2.5-6.0	Perched	Apr-Jun	>60	---	High-----	High-----	Low.
Hoven-----	D	None-----	---	---	+1-1.5	Perched	Mar-Jul	>60	---	Moderate	High-----	Moderate.
OtB, OtC----- Opal	D	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Moderate.
OuD*:												
Opal-----	D	None-----	---	---	>6.0	---	---	20-40	Soft	Low-----	High-----	Moderate.
Sansarc-----	D	None-----	---	---	>6.0	---	---	4-20	Soft	Low-----	High-----	Moderate.
Ow----- Orthents, gravelly	A	None-----	---	---	>6.0		---	>60	---	Low-----	Moderate	Low.
OxD*:												
Orton-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Low-----	Low.
Talmo-----	A	None-----	---	---	>6.0	---	---	>60		Low-----	Moderate	Low.
PgD*:												
Peno-----	C	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
PgD*:												
Gettys	C	None			>6.0		---	>60	---	Low	High	Moderate.
Pk: Plankinton	D	None	---	---	+1-1.0	Perched	Mar-Jul	>60	---	Moderate	High	Moderate.
PrA, PrB: Promise	D	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Ps: Prosper	B	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	High	High	Moderate.
RaA, RaB: Raber	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
RcA*, RcB*:												
Raber	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Cavo	D	None	---	---	3.5-5.0	Perched	Mar-Jun	>60	---	Low	High	Moderate.
RpB*, RpC*:												
Raber	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Peno	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
RrA: Ree	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
RsF*:												
Rock outcrop	D	None	---	---	>6.0	---	---	0-1	Soft	Low	Moderate	Low.
Sansarc	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Moderate.
SbF*:												
Sansarc	D	None	---		>6.0	---	---	4-20	Soft	Low	High	Moderate.
Opal	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.
StA*:												
Stickney	C	None	---	---	3.5-5.0	Apparent	Mar-Jun	>60	---	Moderate	High	High.
Java	B	None	---	---	>6.0			>60	---	Moderate	High	Moderate.
SvA*:												
Stickney	C	None	---	---	3.5-5.0	Apparent	Mar-Jun	>60	---	Moderate	High	High.

See footnote at end of table.

TABLE 17. --SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
SvA*:												
Java	B	None	---		>6.0	--	---	>60	--	Moderate	High	Moderate.
Hoven	D	None	---	---	+1-1.5	Perched	Mar-Jul	>60	-	Moderate	High	Moderate.
TaE, TbA Talmo	A	None	---	---	>6.0	--	---	>60		Low	Moderate	Low.
TcF*:												
Talmo	A	None	---		>6.0	---	---	>60	---	Low	Moderate	Low.
Java	B	None	---		>6.0	---	--	>60	---	Moderate	High	Moderate.
TdD*:												
Talmo	A	None	--	--	>6.0	---	---	>60	---	Low	Moderate	Low.
Delmont	B	None	---	---	>6.0	---	--	>60	---	Low	Moderate	Low.
Te Tetonka	C/D	None	---	---	+1-1.0	Perched	Jan-Dec	>60	-	High	High	Moderate.
Wd Wendte	D	Occasional	Brief	Apr-Oct	3.5-5.0	Apparent	Mar-Jun	>60	---	Low	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Bend	Fine-silty, mixed, mesic Typic Haplustolls
Betts	Fine-loamy, mixed (calcareous), mesic Typic Ustorthents
Blendon	Coarse-loamy, mixed, mesic Pachic Haplustolls
Bon	Fine-loamy, mixed, mesic Cumulic Haplustolls
Bullcreek	Very-fine, smectitic, mesic Typic Haplusterts
Capa	Very-fine, montmorillonitic, mesic Vertic Natrustolls
Carter	Very-fine, montmorillonitic, mesic Vertic Paleustolls
Cavo	Fine, montmorillonitic, mesic Typic Natrustolls
DeGrey	Fine, montmorillonitic, mesic Typic Natrustolls
Delmont	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplustolls
Durrstein	Fine, montmorillonitic, mesic Typic Natraquolls
Eakin	Fine-silty, mixed, mesic Typic Argiustolls
Edwin	Coarse-silty, mixed, mesic Entic Haplustolls
Egas	Fine, smectitic, calcareous, mesic Vertic Endoaquolls
Gettys	Fine, montmorillonitic (calcareous), mesic Vertic Ustorthents
Glenham	Fine-loamy, mixed, mesic Typic Argiustolls
Henkin	Coarse-loamy, mixed, mesic Udic Haplustolls
Highmore	Fine-silty, mixed, mesic Typic Argiustolls
Hoven	Fine, montmorillonitic, mesic Vertic Natraquolls
Hurley	Very-fine, montmorillonitic, mesic Leptic Natrustolls
Java	Fine-loamy, mixed, mesic Entic Haplustolls
Jerauld	Fine, montmorillonitic, mesic Leptic Natrustolls
Kolls	Very-fine, montmorillonitic (calcareous), mesic Typic Epiaquerts
Lawet	Fine-loamy, mesic Typic Calciaquolls
Macken	Fine, smectitic, mesic Vertic Epiaquolls
Oahe	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplustolls
Oko	Fine, montmorillonitic, mesic Vertic Argiustolls
Onita	Fine, montmorillonitic, mesic Pachic Argiustolls
Opal	Fine, smectitic, mesic Leptic Udic Haplusterts
Orthents, gravelly	Orthents
Orton	Coarse-loamy, mixed, mesic Typic Haplustolls
Peno	Fine, montmorillonitic, mesic Vertic Argiustolls
Plankinton	Fine, montmorillonitic, mesic Typic Argialbolls
Promise	Very-fine, smectitic, mesic Typic Haplusterts
Prosper	Fine-loamy, mixed, mesic Pachic Argiustolls
Raber	Fine, montmorillonitic, mesic Typic Argiustolls
Ree	Fine-loamy, mixed, mesic Typic Argiustolls
Sansarc	Clayey, montmorillonitic (calcareous), mesic, shallow Typic Ustorthents
Stickney	Fine, montmorillonitic, mesic Glossic Natrustolls
Talmo	Sandy-skeletal, mixed, mesic Udorthentic Haplustolls
Tetonka	Fine, montmorillonitic, mesic Argiaquic Argialbolls
Walke	Fine, montmorillonitic, mesic Glossic Natrustolls
Wendte	Fine, montmorillonitic (calcareous), mesic Vertic Ustifluvents

Interpretive Groups

INTERPRETIVE GROUPS

Map symbol and soil name	Land capability	Range site	Windbreak suitability group	Pasture suitability group
BdA:				
Bend	IIe-2	Silty	3	F
Edwin	IIIe-12	Thin Upland	8	G
BkE:				
Betts	VIe-3	Thin Upland	10	NS
Java	VIe-3	Silty	10	G
BkF:				
Betts	VIIe-3	Thin Upland	10	NS
Java	VIIe-3	Silty	10	NS
Bn:				
Bon	VIw-1	Loamy Overflow	1	NS
BuA:				
Bullcreek	VIs-5	Dense Clay	10	NS
CcA:				
Capa	VIs-1	Thin Claypan	10	NS
Carter	IVs-2	Claypan	9	C
ClA:				
Capa	VIs-1	Thin Claypan	10	NS
Slickspots	VIIIs-2	Not assigned	10	NS
CpA:				
Carter	IVs-2	Claypan	9	C
Promise	IIIs-3	Clayey	4	I
CrA:				
Cavo	IVs-2	Claypan	9	C
Jerauld	VIs-1	Thin Claypan	10	NS
Cs:				
Cavo	IVs-2	Claypan	9	C
Stickney	IIIs-1	Clayey	4	E
Df:				
DeGrey	IVs-2	Claypan	9	C
Walke	IIIs-1	Clayey	4	E
DnB:				
Delmont	IVe-6	Shallow to Gravel	6	D2
Oahe	IIIe-6	Silty	6	D1
Du:				
Durrstein	VIs-6	Saline Lowland	10	J
Egas	VIs-6	Saline Lowland	10	J
EpC:				
Eakin	IIIe-1	Silty	3	F
Peno	IVe-3	Clayey	4	F

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Range site	Windbreak suitability group	Pasture suitability group
ErA:				
Eakin----------	IIc-2	Silty------------------------	3	F
Raber----------	IIs-1	Clayey-----------------------	4	E
ErB:				
Eakin----------	IIe-2	Silty------------------------	3	F
Raber----------	IIIe-3	Clayey-----------------------	4	E
GfF:				
Gettys---------	VIIe-3	Thin Upland------------------	10	NS
Sansarc--------	VIIe-8	Shallow Clay-----------------	10	NS
GmB:				
Glenham--------	IIe-2	Silty------------------------	3	F
Java-----------	IIIe-12	Silty------------------------	8	G
GnA:				
Glenham--------	IIe-2	Silty------------------------	3	F
Java-----------	IIIe-12	Silty------------------------	8	G
Cavo-----------	IVs-2	Claypan----------------------	9	C
GrA:				
Glenham--------	IIc-2	Silty------------------------	3	F
Prosper--------	IIc-3	Loamy Overflow---------------	1	K
GrB:				
Glenham--------	IIe-2	Silty------------------------	3	F
Prosper--------	IIe-3	Silty------------------------	1	K
GsA:				
Glenham--------	IIe-2	Silty------------------------	3	F
Prosper--------	IIc-3	Loamy Overflow---------------	1	K
Hoven----------	VIs-1	Closed Depression------------	10	B2
GtB:				
Glenham--------	IIe-2	Silty------------------------	3	F
Prosper--------	IIe-3	Silty------------------------	1	K
Java-----------	IIIe-12	Silty------------------------	8	G
GtB:				
Glenham--------	IIe-2	Silty------------------------	3	F
Stickney-------	IIIs-1	Clayey-----------------------	4	E
Hoven----------	VIs-1	Closed Depression------------	10	B2
HaA:				
Henkin---------	IIIe-8	Sandy------------------------	5	H
Blendon--------	IIIe-8	Sandy------------------------	5	H

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Range site	Windbreak suitability group	Pasture suitability group
HdA:				
Highmore	IIc-2	Silty	3	F
DeGrey	IVs-2	Claypan	9	C
HdB:				
Highmore	IIe-2	Silty	3	F
DeGrey	IVs-3	Claypan	9	C
HeA:				
Highmore	IIc-2	Silty	3	F
Eakin	IIc-2	Silty	3	F
HeB:				
Highmore	IIe-2	Silty	3	F
Eakin	IIe-3	Silty	3	F
Ho:				
Hoven	VIs-1	Closed Depression	10	B2
HuB:				
Hurley	VIs-1	Thin Claypan	10	NS
JaC:				
Java	VIIs-6	Silty	10	NS
Glenham	IIIe-2	Silty	3	F
Prosper	IIe-3	Silty	1	K
JbD:				
Java	VIe-3	Silty	8	G
Betts	VIe-3	Thin Upland	8	G
JcD:				
Java	VIe-3	Silty	10	NS
Betts	VIIs-6	Thin Upland	10	NS
JgB:				
Java	IIIe-12	Silty	8	G
Glenham	IIe-2	Silty	3	F
JgC:				
Java	IVe-3	Silty	8	G
Glenham	IIIe-2	Silty	3	F
JhC:				
Java	IVe-3	Silty	8	G
Glenham	IIIe-2	Silty	3	F
Prosper	IIe-3	Silty	1	K
JsA:				
Jerauld	VIs-1	Thin Claypan	10	NS
Slickspots	VIIIs-2	Not assigned	10	NS

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Range site	Windbreak suitability group	Pasture suitability group
Ko:				
Kolls	Vw-4	Closed Depression	10	B2
Lc:				
Lawet	IVw-1	Subirrigated	2	B1
Ma:				
Macken	Vw-4	Closed Depression	10	B2
Mb:				
Macken	VIIIw-1	Not assigned	10	NS
OaA:				
Oahe	IIIs-2	Silty	6	D1
OdA:				
Oahe	IIIs-2	Silty	6	D1
Delmont	IVs-1	Shallow to Gravel	6	D2
OkB:				
Oko	IIIe-4	Clayey	4	I
OkC:				
Oko	IVe-4	Clayey	4	I
OkD:				
Oko	VIe-4	Clayey	10	NS
OnA:				
Onita	IIc-3	Silty	1	K
Os:				
Onita	IIc-3	Loamy Overflow	1	K
Hoven	VIs-1	Closed Depression	10	B2
OtB:				
Opal	IIIe-4	Clayey	4	I
OtC:				
Opal	IVe-4	Clayey	4	I
OuD:				
Opal	VIe-4	Clayey	10	NS
Sansarc	VIe-12	Shallow Clay	10	NS
Ow:				
Orthents	VIIIs-2	Not assigned	10	NS
OxD:				
Orton	VIe-6	Sandy	10	NS
Talmo	VIs-4	Very Shallow	10	NS
PgD:				
Peno	VIe-3	Clayey	10	NS
Gettys	VIe-3	Thin Upland	10	NS
Pk:				
Plankinton	IVw-1	Closed Depression	10	B2

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Range site	Windbreak suitability group	Pasture suitability group
PrA:				
Promise	IIIs-3	Clayey	4	I
PrB:				
Promise	IIIe-4	Clayey	4	I
Ps:				
Prosper	IIc-3	Loamy Overflow	1	K
RaA:				
Raber	IIs-1	Clayey	4	E
RaB:				
Raber	IIIe-3	Clayey	4	E
RcA:				
Raber	IIs-1	Clayey	4	E
Cavo	IVs-2	Claypan	9	C
RcB:				
Raber	IIIe-3	Clayey	4	E
Cavo	IVs-2	Claypan	9	C
RpB:				
Raber	IIIe-3	Clayey	4	E
Peno	IIIe-12	Cleyey	4	F
RpC:				
Raber	IVe-3	Clayey	4	E
Peno	IVe-3	Cleyey	4	F
RrA:				
Ree	IIc-2	Silty	3	F
RsF:				
Rock outcrop	VIIIs-2	Not assigned	10	NS
Sansarc	VIIe-8	Shallow Clay	10	NS
SbF:				
Sansarc	VIIe-8	Shallow Clay	10	NS
Opal	VIe-4	Clayey	10	NS
StA:				
Stickney	IIIs-1	Clayey	4	E
Java	IIIe-12	Silty	8	G
SvA:				
Stickney	IIIs-1	Clayey	4	E
Java	IIIe-12	Silty	8	G
Hoven	VIs-1	Closed Depression	10	B2
TaE:				
Talmo	VIs-4	Very Shallow	10	NS
TbA:				
Talmo	VIs-4	Very Shallow	10	NS

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Range site	Windbreak suitability group	Pasture suitability group
TcF:				
Talmo	VIIs-4	Very Shallow	10	NS
Java	VIIe-3	Silty	10	NS
TdD:				
Talmo	VIs-4	Very Shallow	10	NS
Delmont	VIe-5	Shallow to Gravel	10	NS
Te:				
Tetonka	IVw-1	Wet Meadow	10	B2
Wd:				
Wendte	VIw-1	Clayey Overflow	4	NS

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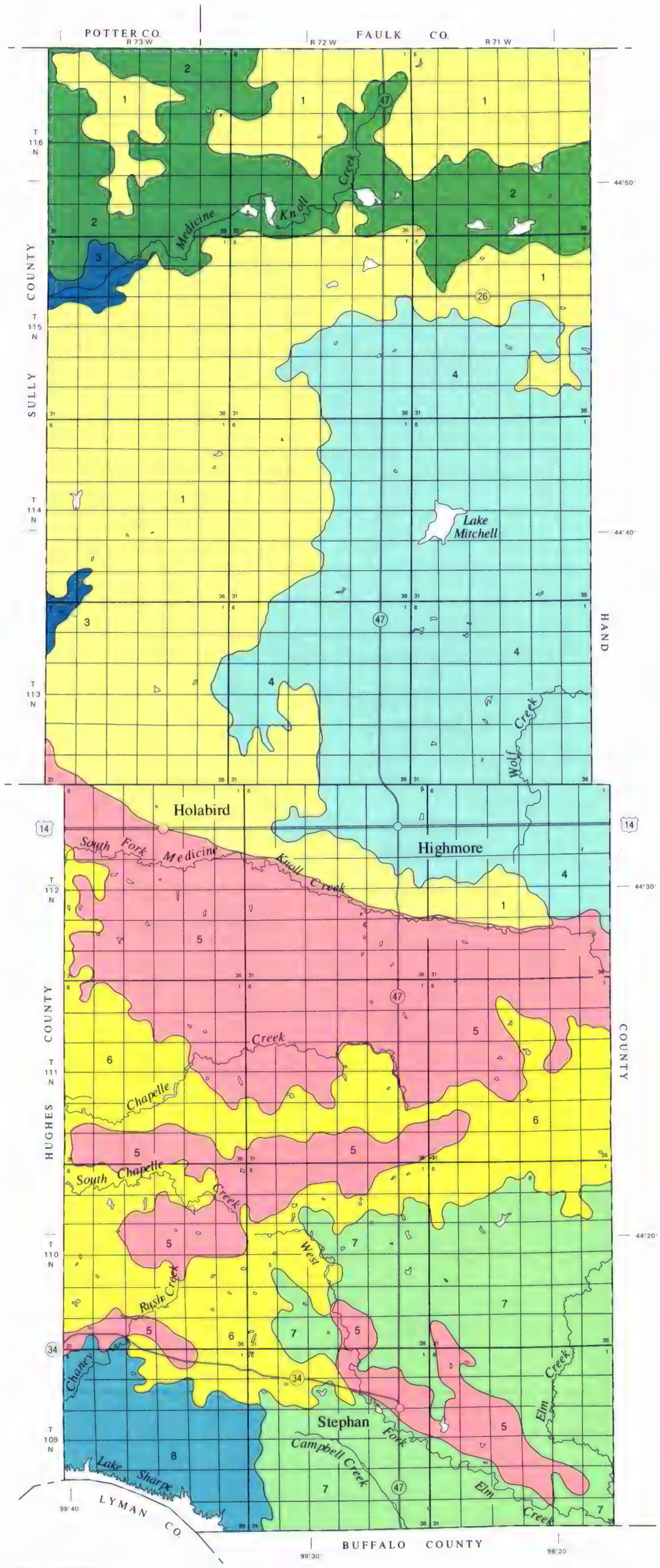
Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



SOIL LEGEND*

LEVEL TO MODERATELY STEEP, LOAMY AND SILTY SOILS ON TILL PLAINS AND MORAINES

- 1 Glenham-Prosper-Java association
- 2 Java-Glenham association
- 3 Java-Betts association
- 4 Java-Stickney-Hoven association

NEARLY LEVEL TO MODERATELY SLOPING, SILTY AND LOAMY SOILS ON TILL PLAINS AND MORAINES

- 5 Highmore-DeGrey association
- 6 Eakin-Raber association

NEARLY LEVEL TO STEEP, CLAYEY SOILS ON PLAINS AND DISSECTED PLAINS

- 7 Opal-Promise association
- 8 Sansarc-Opal association

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1997

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
in cooperation with
UNITED STATES DEPARTMENT OF INTERIOR
BUREAU OF INDIAN AFFAIRS
and
SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

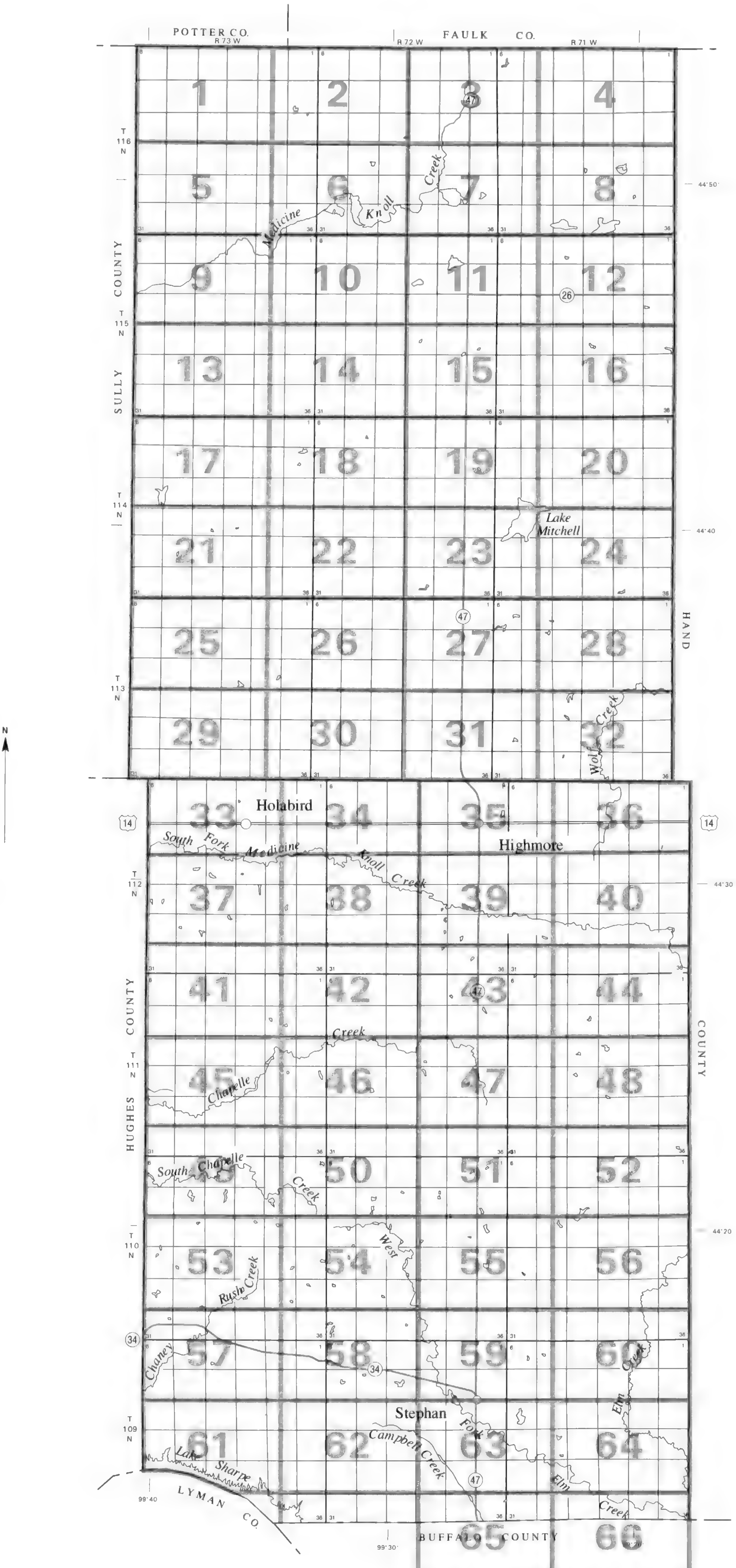
GENERAL SOIL MAP

HYDE COUNTY, SOUTH DAKOTA

Scale 1:190080

1 0 1 2 3 MILES

1 0 1 2 3 4 5 6 KILOMETERS



Original text from each individual map sheet read:
This map is compiled on 1976 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS

HYDE COUNTY, SOUTH DAKOTA

Scale 1:190080

1 0 1 2 3 MILES

1 0 1 2 3 4 5 6 KILOMETERS

SOIL LEGEND

Map symbols for publication consist of a combination of letters. The first letter is the initial one of the map unit. The lowercase letter that follows separates map units having names that begin with the same letter, except that it does not separate sloping phases. The second capital letter indicates the slope class. Symbols without a slope letter are for level or nearly level soils which do not occur as steeper slope phases.

SYMBOL	NAME
BdA	Bend-Edwin complex, 0 to 4 percent slopes
BkE	Betts-Java loams, 9 to 20 percent slopes
BkF	Betts-Java loams, 20 to 40 percent slopes
Bn	Bon loam, channeled
BuA	Bullcreek clay, 0 to 6 percent slopes
CcA	Capa-Carter silt loams, 0 to 4 percent slopes
ClA	Capa-Slickspots complex, 0 to 4 percent slopes
CpA	Carter-Promise complex, 0 to 3 percent slopes
CrA	Cavo-Jerauld loams, 0 to 4 percent slopes
Cs	Cavo-Stickney loams
Df	DeGrey-Walke silt loams
DnB	Delmont-Oahe loams, 2 to 6 percent slopes
Du	Durrstein-Egas complex
EpC	Eakin-Peno complex, 6 to 9 percent slopes
ErA	Eakin-Raber complex, 0 to 2 percent slopes
ErB	Eakin-Raber complex, 2 to 6 percent slopes
GlF	Gettys-Sansarc complex, 9 to 40 percent slopes
GmB	Glenham-Java loams, 2 to 6 percent slopes
GnA	Glenham-Java-Cavo loams, 0 to 4 percent slopes
GrA	Glenham-Prosper loams, 0 to 2 percent slopes
GrB	Glenham-Prosper loams, 2 to 6 percent slopes
GsA	Glenham-Prosper-Hoven complex, 0 to 4 percent slopes
GtB	Glenham-Prosper-Java loams, 1 to 6 percent slopes
GuA	Glenham-Stickney-Hoven complex, 0 to 4 percent slopes
HaA	Henkin-Blendon fine sandy loams, 0 to 4 percent slopes
HdA	Highmore-DeGrey silt loams, 0 to 2 percent slopes
HdB	Highmore-DeGrey silt loams, 2 to 6 percent slopes
HeA	Highmore-Eakin silt loams, 0 to 2 percent slopes
HeB	Highmore-Eakin silt loams, 2 to 6 percent slopes
Ho	Hoven silt loam
HuB	Hurley silt loam, 0 to 6 percent slopes
JaC	Java, stony-Glenham-Prosper loams, 1 to 9 percent slopes
JbD	Java-Betts loams, 6 to 15 percent slopes
JcD	Java-Betts, stony, loams, 6 to 25 percent slopes
JgB	Java-Glenham loams, 2 to 6 percent slopes
JgC	Java-Glenham loams, 6 to 9 percent slopes
JhC	Java-Glenham-Prosper loams, 1 to 9 percent slopes
JsA	Jerauld-Slickspots complex, 0 to 4 percent slopes
Ko	Kolls clay
Lc	Lawet loam
Ma	Macken silty clay loam
Mb	Macken silty clay loam, ponded
OaA	Oahe loam, 0 to 2 percent slopes
OdA	Oahe-Delmont loams, 0 to 2 percent slopes
OkB	Oko clay loam, 2 to 6 percent slopes
OkC	Oko clay loam, 6 to 9 percent slopes
OkD	Oko clay loam, 9 to 20 percent slopes
OnA	Onita silt loam, 0 to 2 percent slopes
Os	Onita-Hoven silt loams
OtB	Opal clay, 2 to 6 percent slopes
OtC	Opal clay, 6 to 9 percent slopes
OuD	Opal-Sansarc clays, 9 to 20 percent slopes
Ow	Orthents, gravelly
OxD	Orton-Talmo loams, 9 to 25 percent slopes
PgD	Peno-Gettys complex, 9 to 25 percent slopes
Pk	Plankinton silt loam
PrA	Promise silty clay, 0 to 2 percent slopes
PrB	Promise silty clay, 2 to 6 percent slopes
Ps	Prosper loam
RaA	Raber loam, 0 to 2 percent slopes
RaB	Raber loam, 2 to 6 percent slopes
RcA	Raber-Cavo loams, 0 to 2 percent slopes
RcB	Raber-Cavo loams, 2 to 6 percent slopes
RpB	Raber-Peno loams, 2 to 6 percent slopes
RpC	Raber-Peno loams, 6 to 9 percent slopes
RrA	Ree loam, 0 to 2 percent slopes
RsF	Rock outcrop-Sansarc complex, 15 to 40 percent slopes
SbF	Sansarc-Opal clays, 15 to 40 percent slopes
StA	Stickney-Java loams, 0 to 4 percent slopes
SvA	Stickney-Java-Hoven complex, 0 to 4 percent slopes
TaE	Talmo loam, 9 to 25 percent slopes
TbA	Talmo sandy loam, 0 to 3 percent slopes
TcF	Talmo, stony-Java loams, 9 to 40 percent slopes
TdD	Talmo-Delmont loams, 3 to 15 percent slopes
Te	Tetonka silt loam
W	Water
Wd	Wendte silty clay, channeled

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate 173
- Federal 287
- State 52
- County, farm or ranch 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small (Named where applicable)

PITS

- Gravel pit (< 2 acres)
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area) (occupied)
- Church
- School
- Indian mound (label)
- Located object (label) Tower
- Tank (label) Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS Ma Cra

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

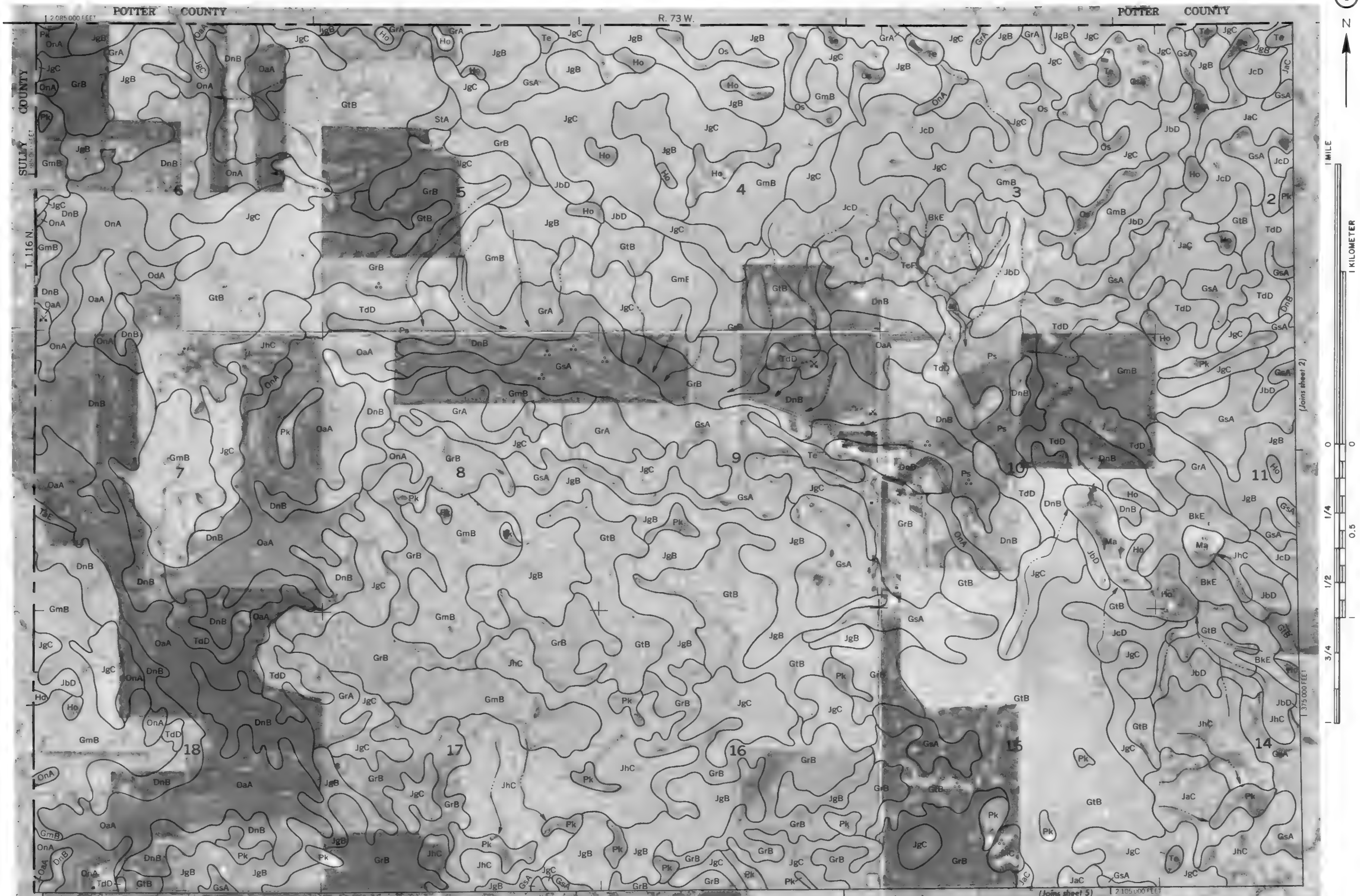
GULLY

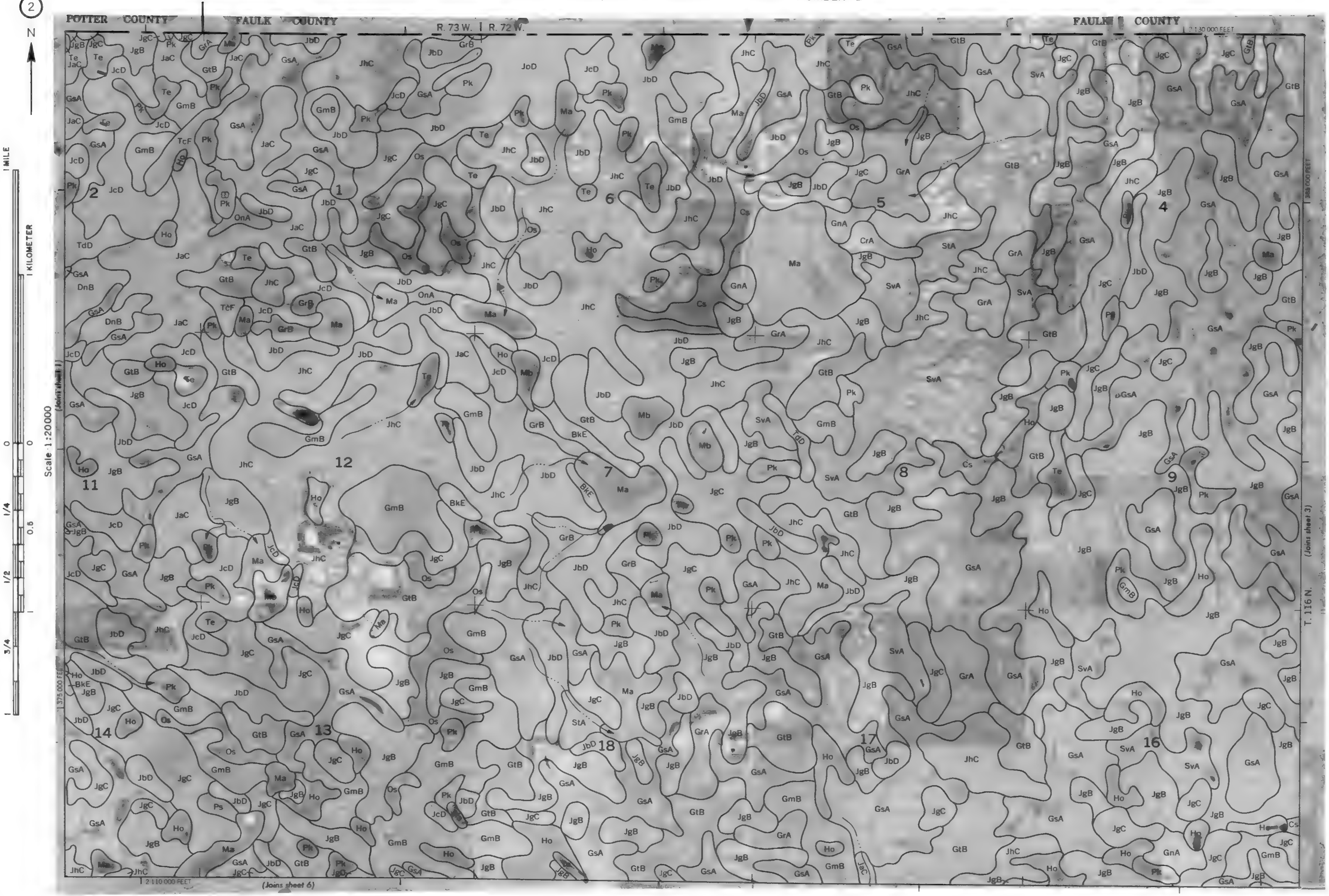
DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

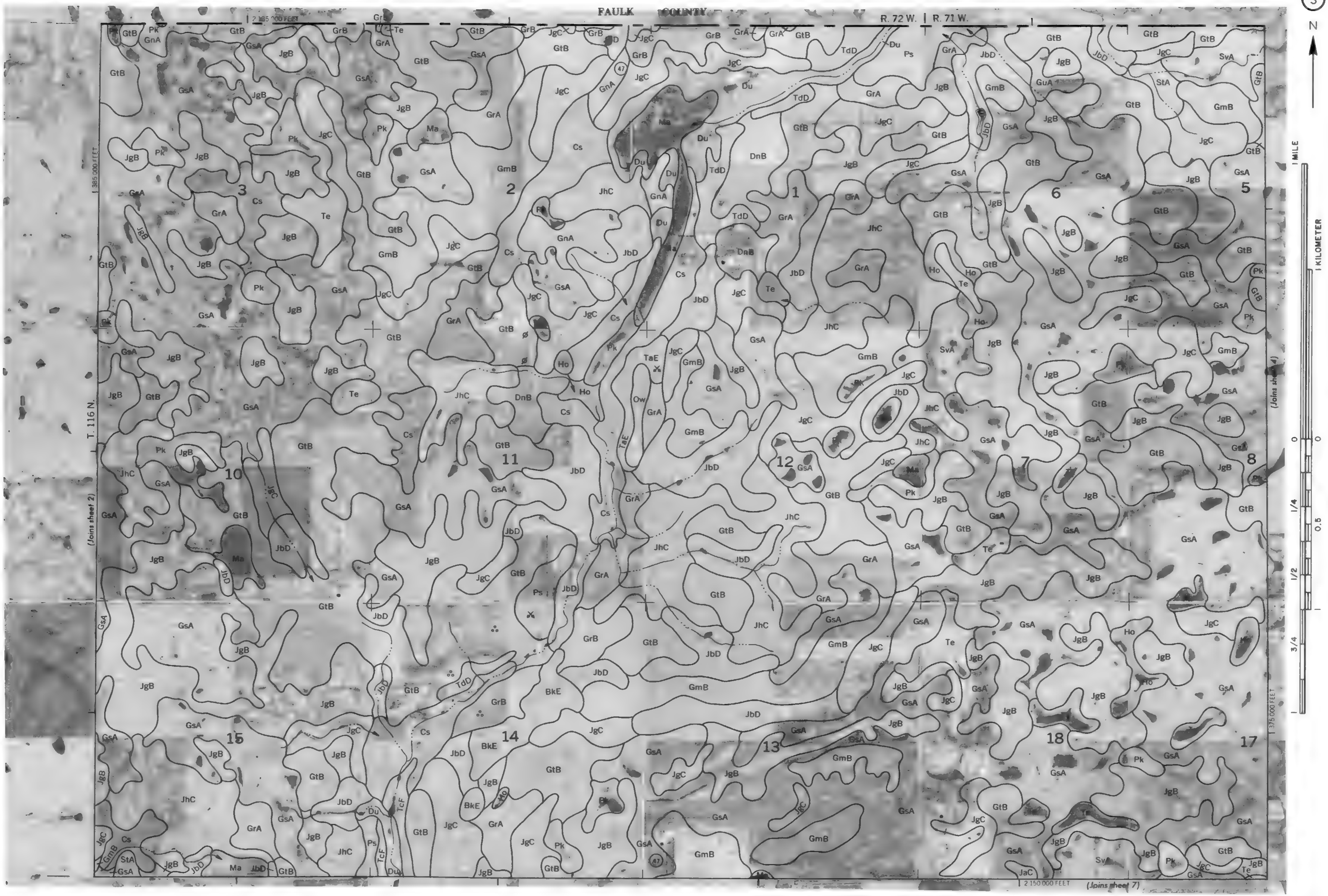
MISCELLANEOUS

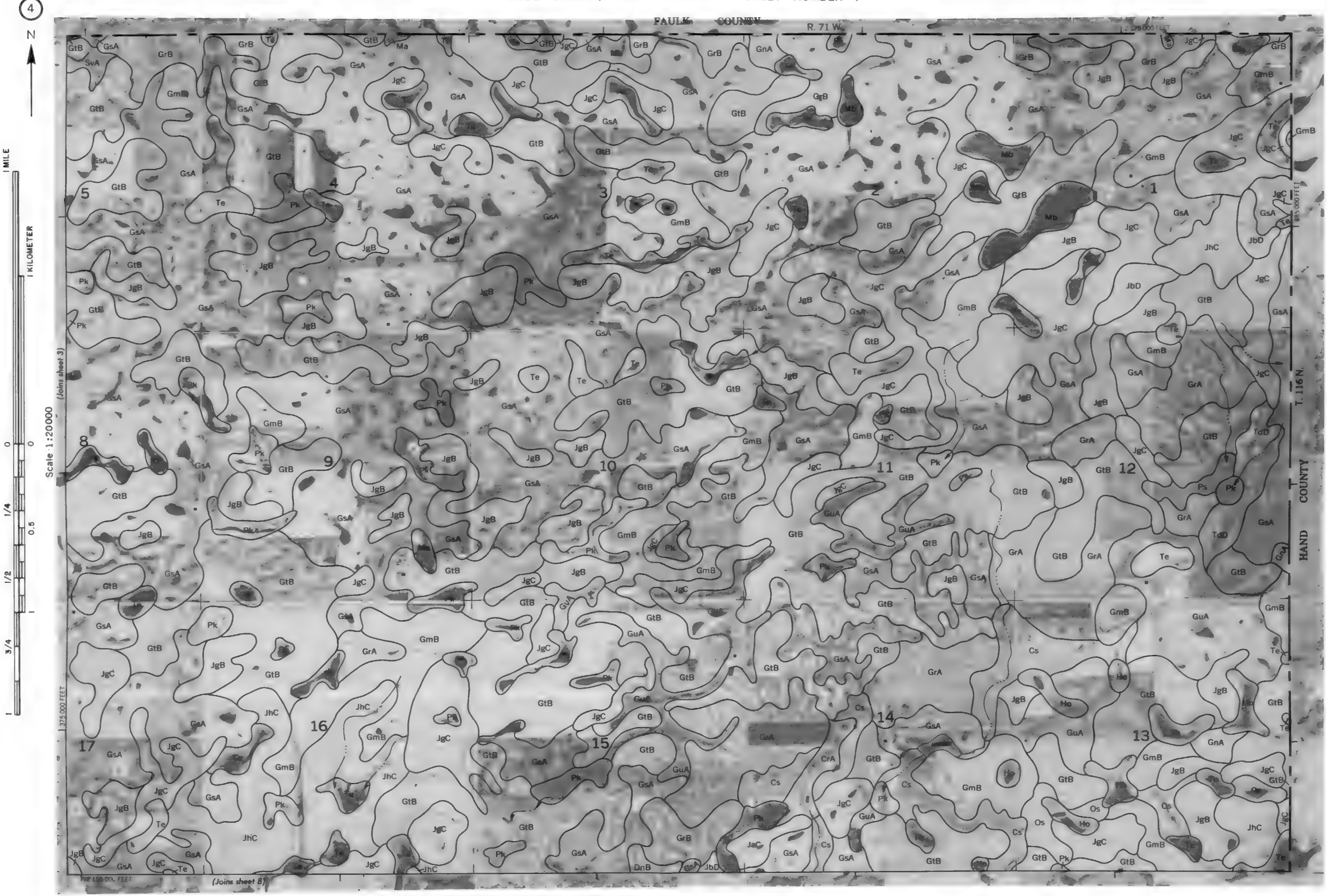
- Blowout
- Clay spot
- Gravelly spot (< 2 acres)
- Gumbo, slick or scabby spot (sodic)(< 2 acres)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot (< 2 acres)

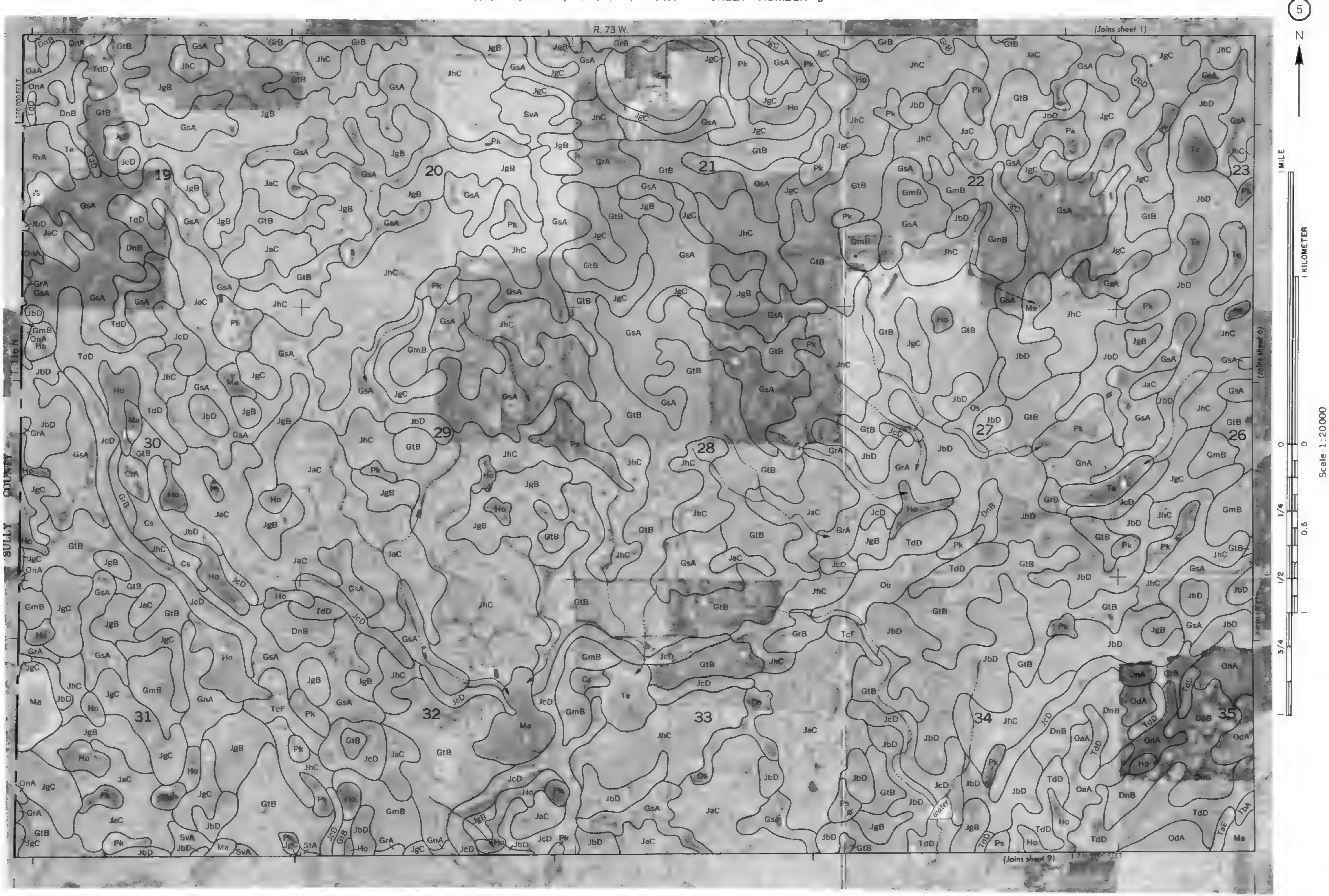

POTTER COUNTY
R. 73 W.
POTTER COUNTY
SULLY COUNTY
T. 116 N.
(Joins sheet 2)
(Joins sheet 5)
2 085 000 FEET
2 105 000 FEET
375 000 FEET
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:20000
1
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18

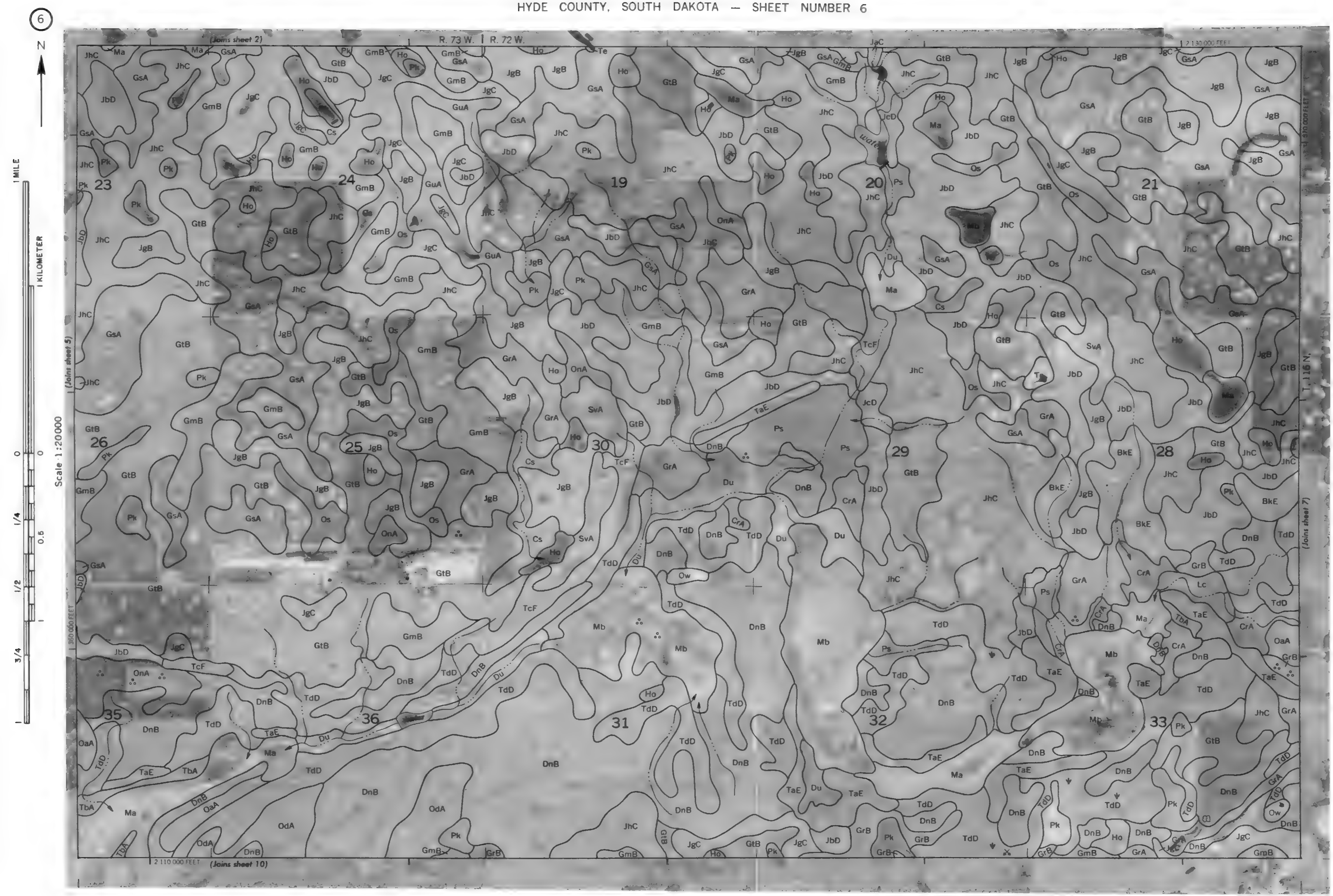

2
N
POTTER COUNTY
FAULK COUNTY
R. 73 W. | R. 72 W.
FAULK COUNTY
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 6)
T. 116 N.

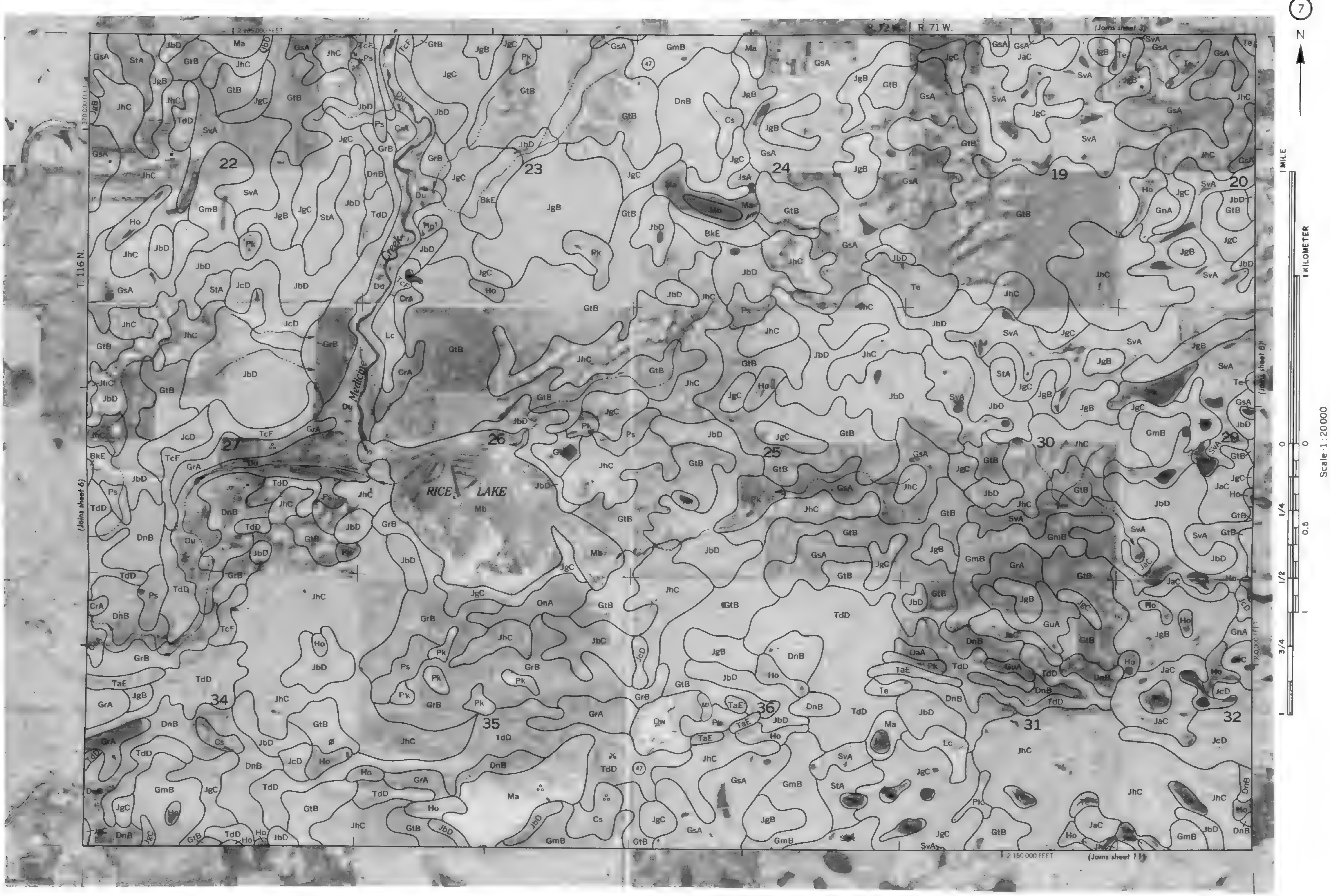
HYDE COUNTY, SOUTH DAKOTA — SHEET NUMBER 3

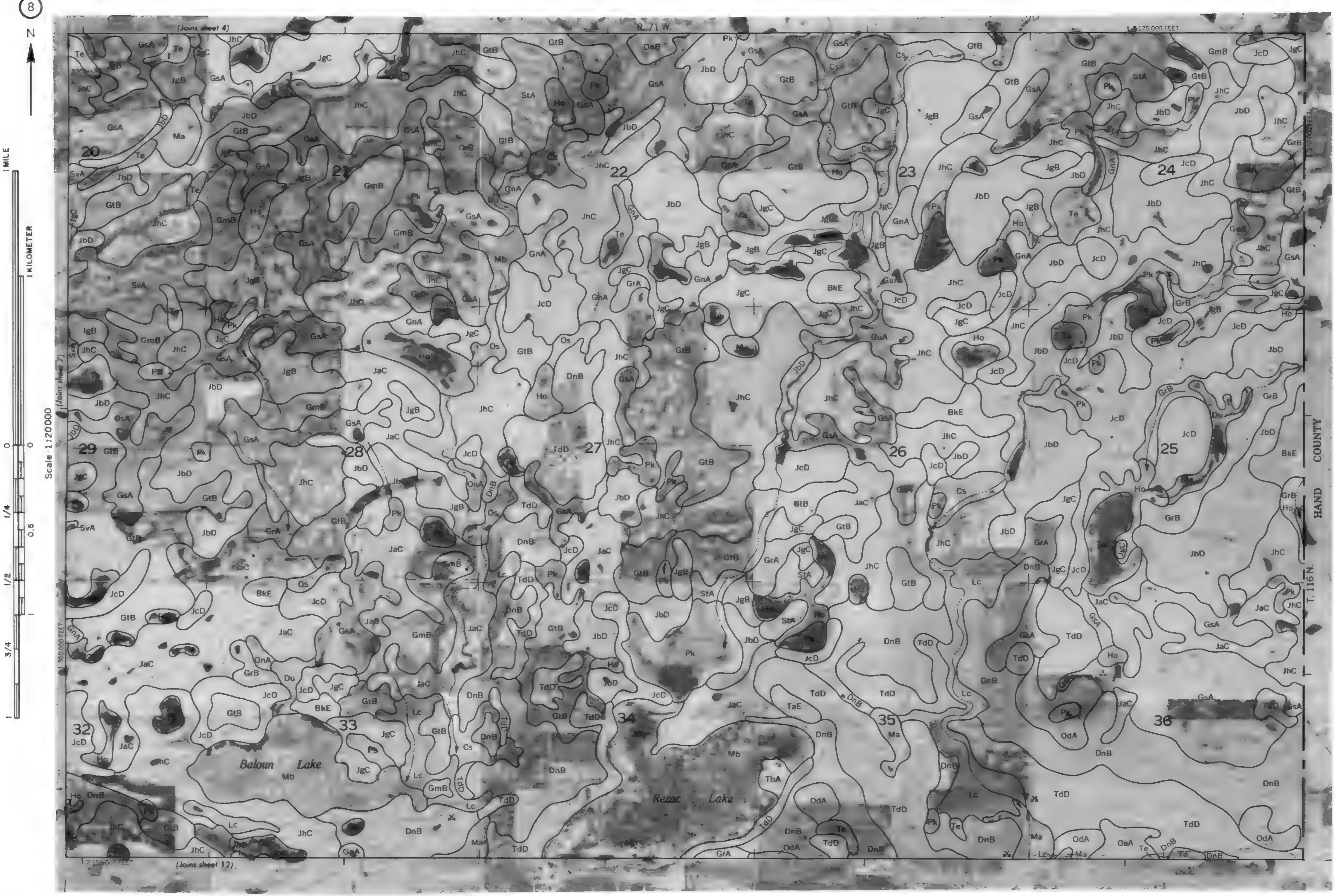


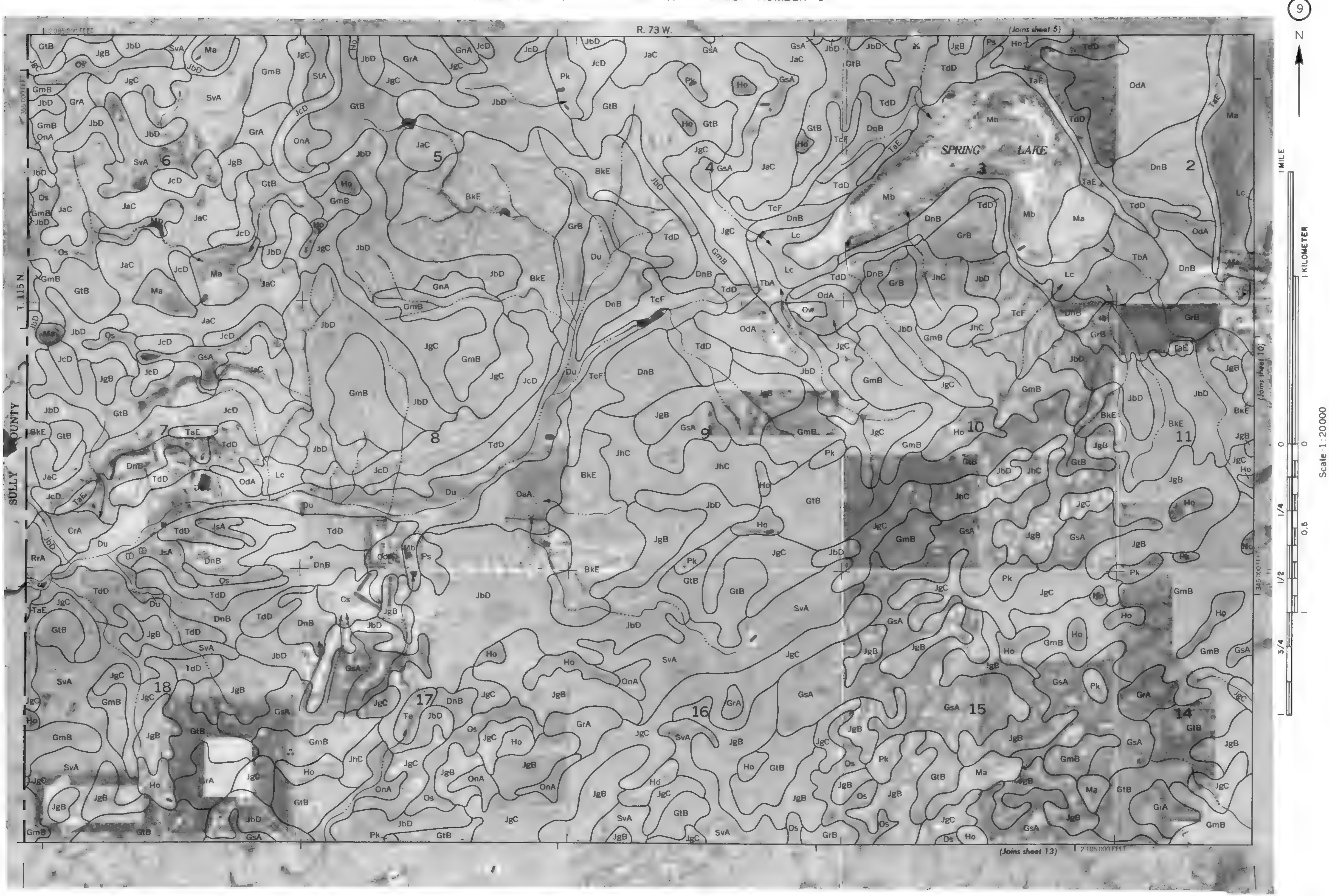

4
N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
0.5
1/2
1
3/4
FAULK COUNTY
R. 71 W.
T. 116 N.
HAND COUNTY
(Joins sheet 3)
(Joins sheet 8)
375 000 FEET
885 000 FEET
2 225 000 FEET
2 155 000 FEET
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17


5
N
R. 73 W.
(Joins sheet 1)
(Joins sheet 6)
(Joins sheet 9)
SULLY COUNTY
T. 116 N.
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
1 MILE
1 KILOMETER
Scale 1:20000


6
N
1 MILE
1 KILOMETER
Scale 1:20000
(Joins sheet 2)
R. 73 W. | R. 72 W.
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 10)
T. 116 N.
2 110 000 FEET
350 000 FEET
2 130 000 FEET
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36

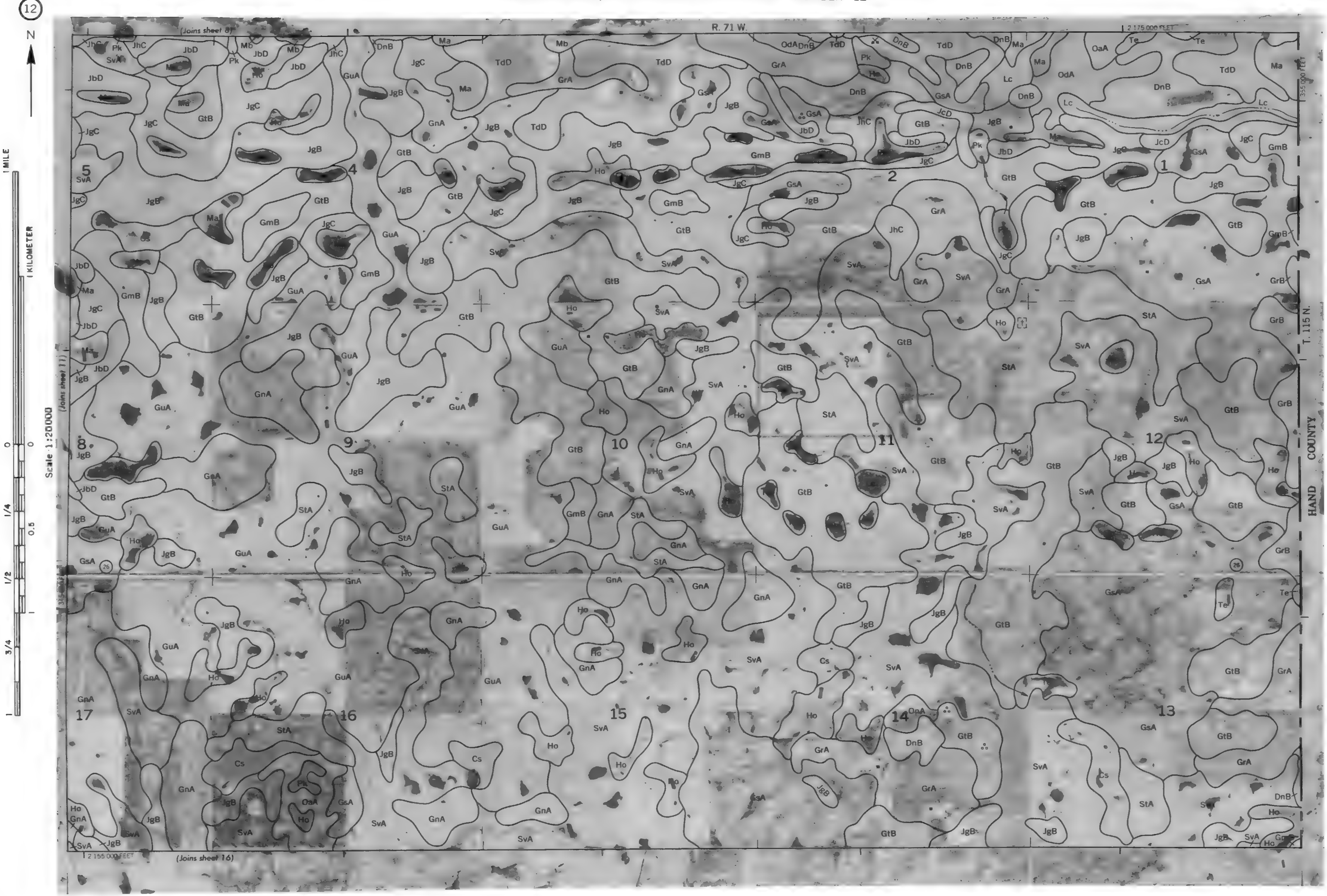

7
N
R. 72 W. | R. 71 W.
(Joins sheet 3)
(Joins sheet 6)
(Joins sheet 8)
(Joins sheet 11)
T. 116 N.
RICE LAKE
Medicine Creek
1 MILE
1 KILOMETER
Scale 1:20000
2 150 000 FEET
370 000 FEET
350 000 FEET

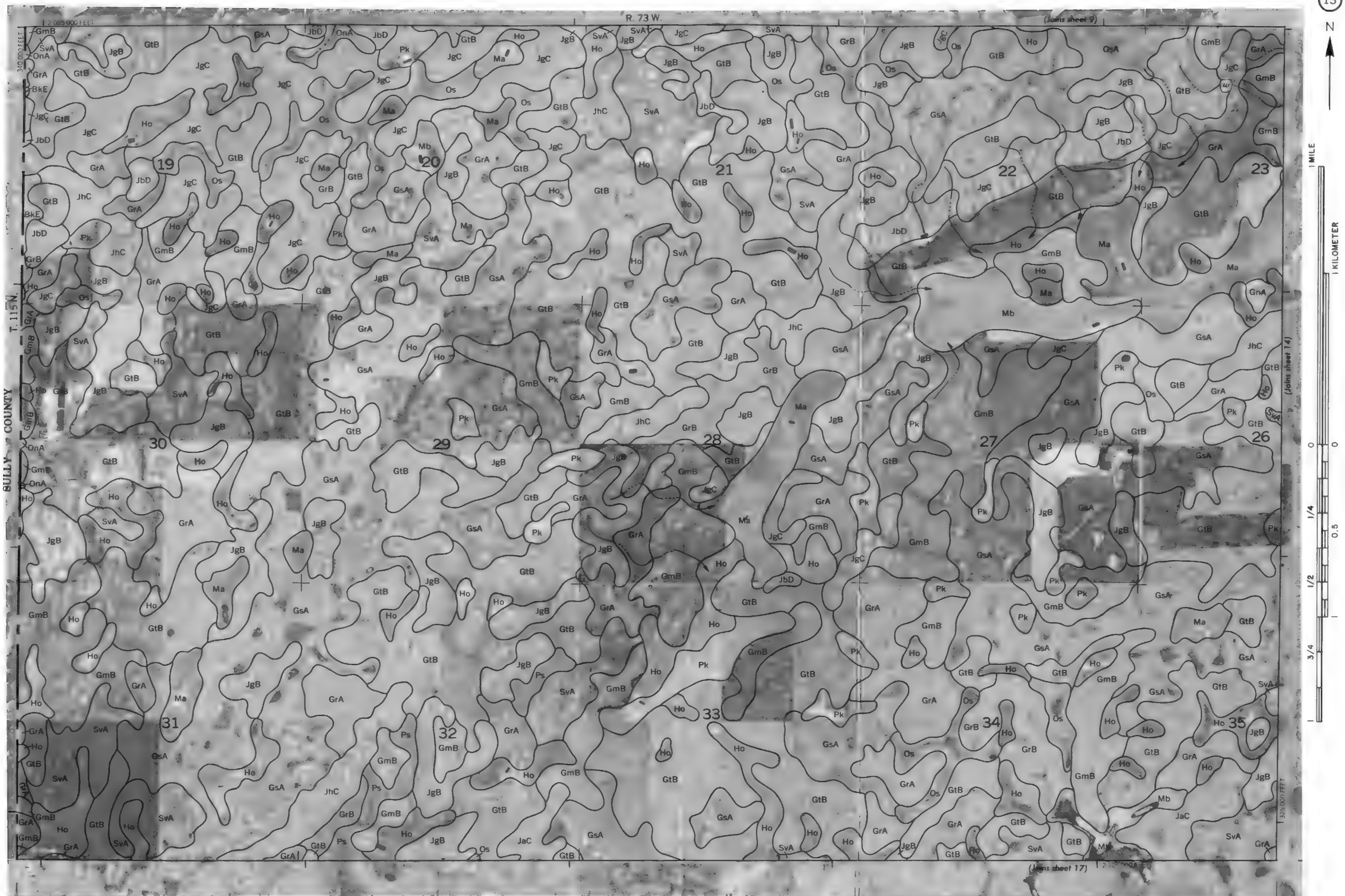

(Joins sheet 4)
(Joins sheet 12)
(Joins sheet 7)
R. 71 W.
T. 116 N.
HAND COUNTY
Baloun Lake
Rezac Lake
Scale 1:20000
1 MILE
1 KILOMETER
N


9
N
R. 73 W.
(Joins sheet 5)
(Joins sheet 10)
(Joins sheet 13)
2 085 000 FEET
2 105 000 FEET
345 000 FEET
T. 115 N.
SULLY COUNTY
SPRING LAKE
1 MILE
1 KILOMETER
Scale 1:20000


10
N
1 MILE
1 KILOMETER
Scale 1:20000
(Joins sheet 6)
R. 73 W. R. 72 W.
(Joins sheet 9)
(Joins sheet 11)
(Joins sheet 14)
T. 115 N.
2 130 000 FEET
2 110 000 FEET
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18


N
R. 72 W.
R. 71 W.
(Joins sheet 7)
(Joins sheet 10)
(Joins sheet 12)
(Joins sheet 15)
2 135 000 FEET
2 150 000 FEET
T. 115 N.
1 MILE
1 KILOMETER
Scale 1:20 000
0
1/4
1/2
3/4
1
0.5
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18

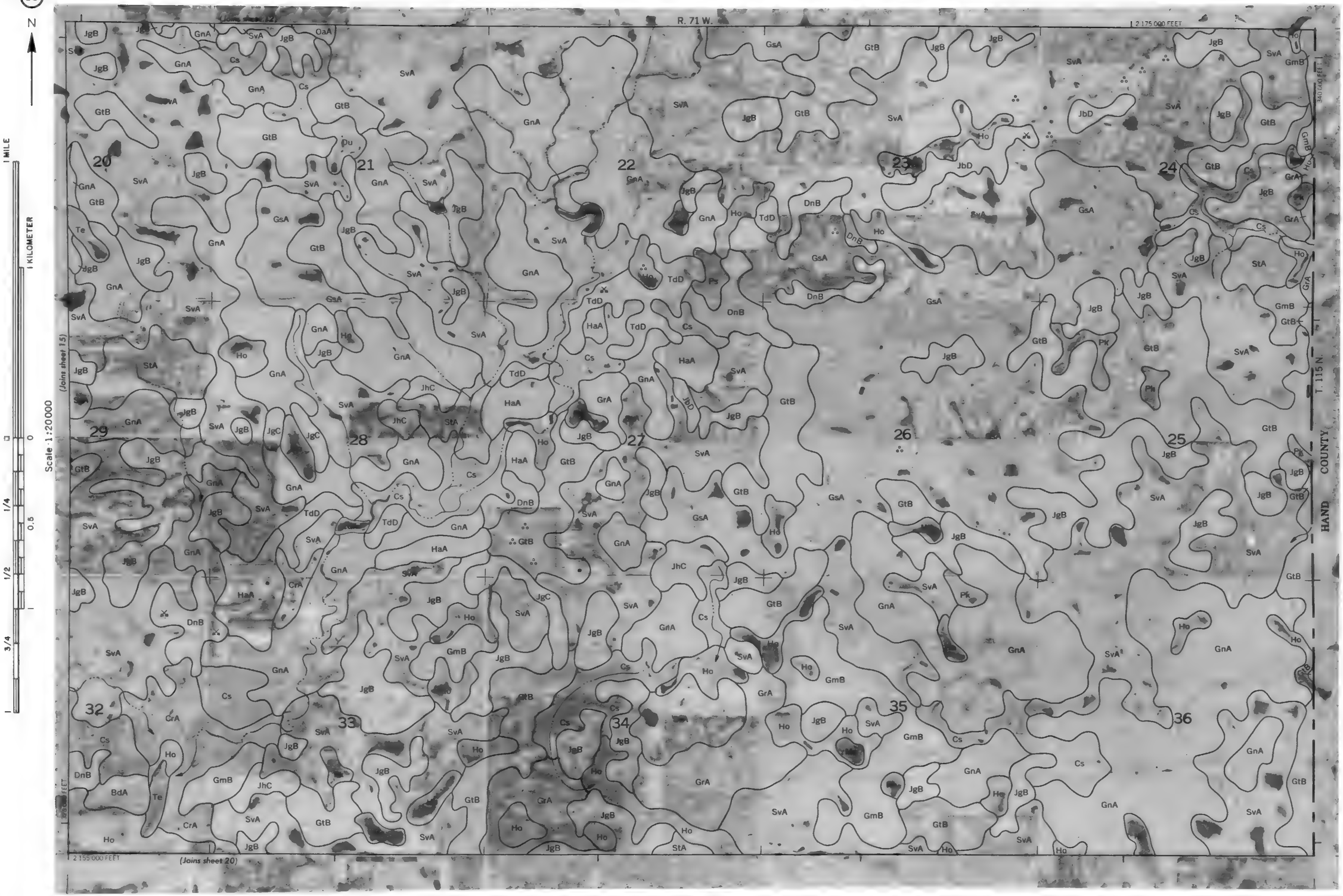

12
N
(Joins sheet 8)
R. 71 W.
2 175 000 FEET
355 000 FEET
T. 115 N.
HAND COUNTY
(Joins sheet 11)
(Joins sheet 16)
2 155 000 FEET
Scale 1:20000
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5


13
N
R. 73 W.
(Joins sheet 9)
T. 115 N.
SULLY COUNTY
(Joins sheet 14)
(Joins sheet 17)
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
1 MILE
1 KILOMETER
Scale 1:20000


14
N
1 MILE
1 KILOMETER
Scale 1:20000
(Joins sheet 10)
(Joins sheet 13)
(Joins sheet 15)
(Joins sheet 18)
R. 73 W. | R. 72 W.
T. 115 N.
2 130 000 FEET
2 110 000 FEET
340 000 FEET

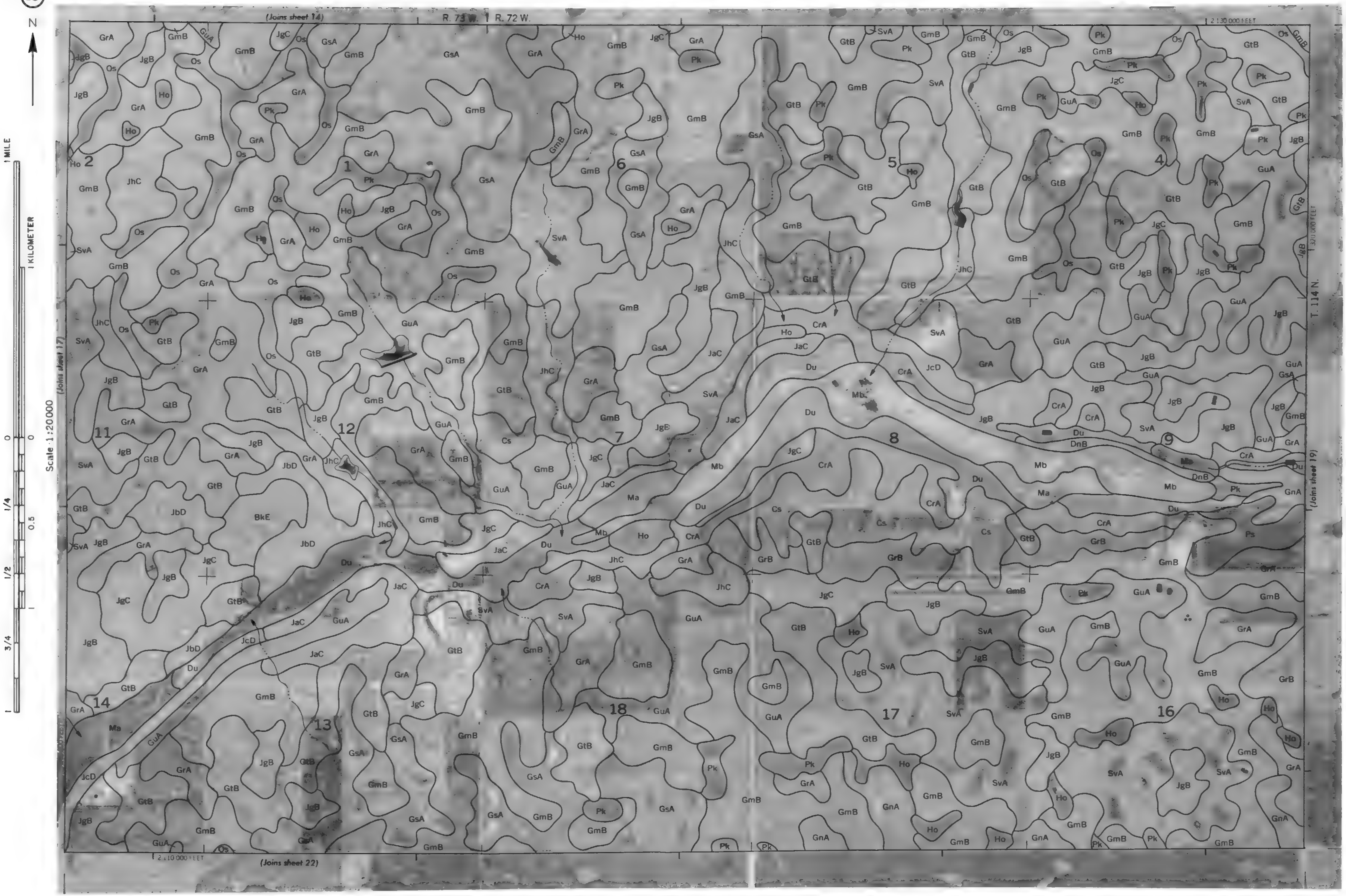
15

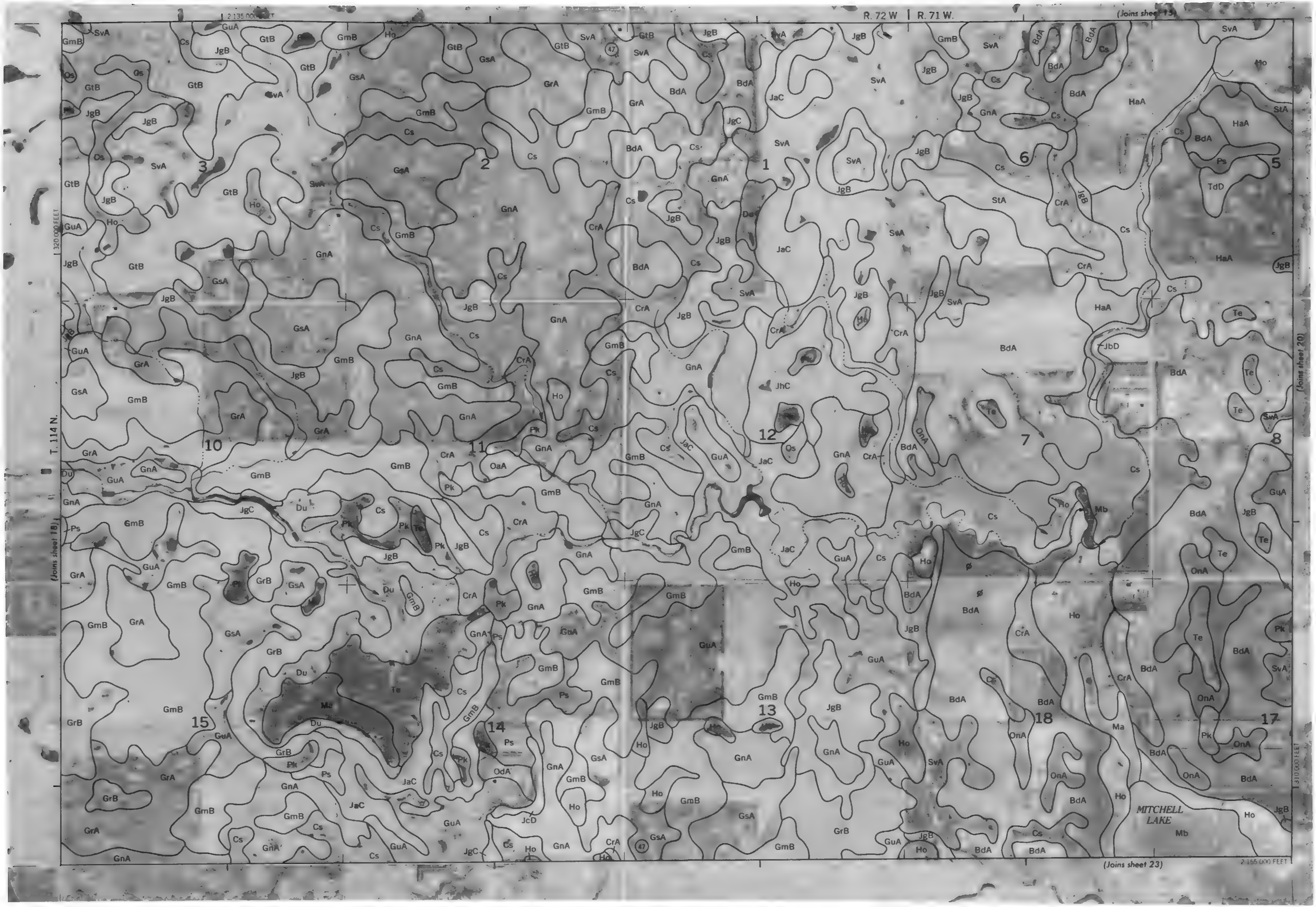

N
(Joins sheet 11)
(Joins sheet 14)
(Joins sheet 16)
(Joins sheet 19)
R. 72 W.
R. 71 W.
T. 115 N.
2 135 000 FEET
2 155 000 FEET
340 000 FEET
325 000 FEET
19
20
22
23
24
25
26
27
29
30
31
32
34
35
36
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:20000

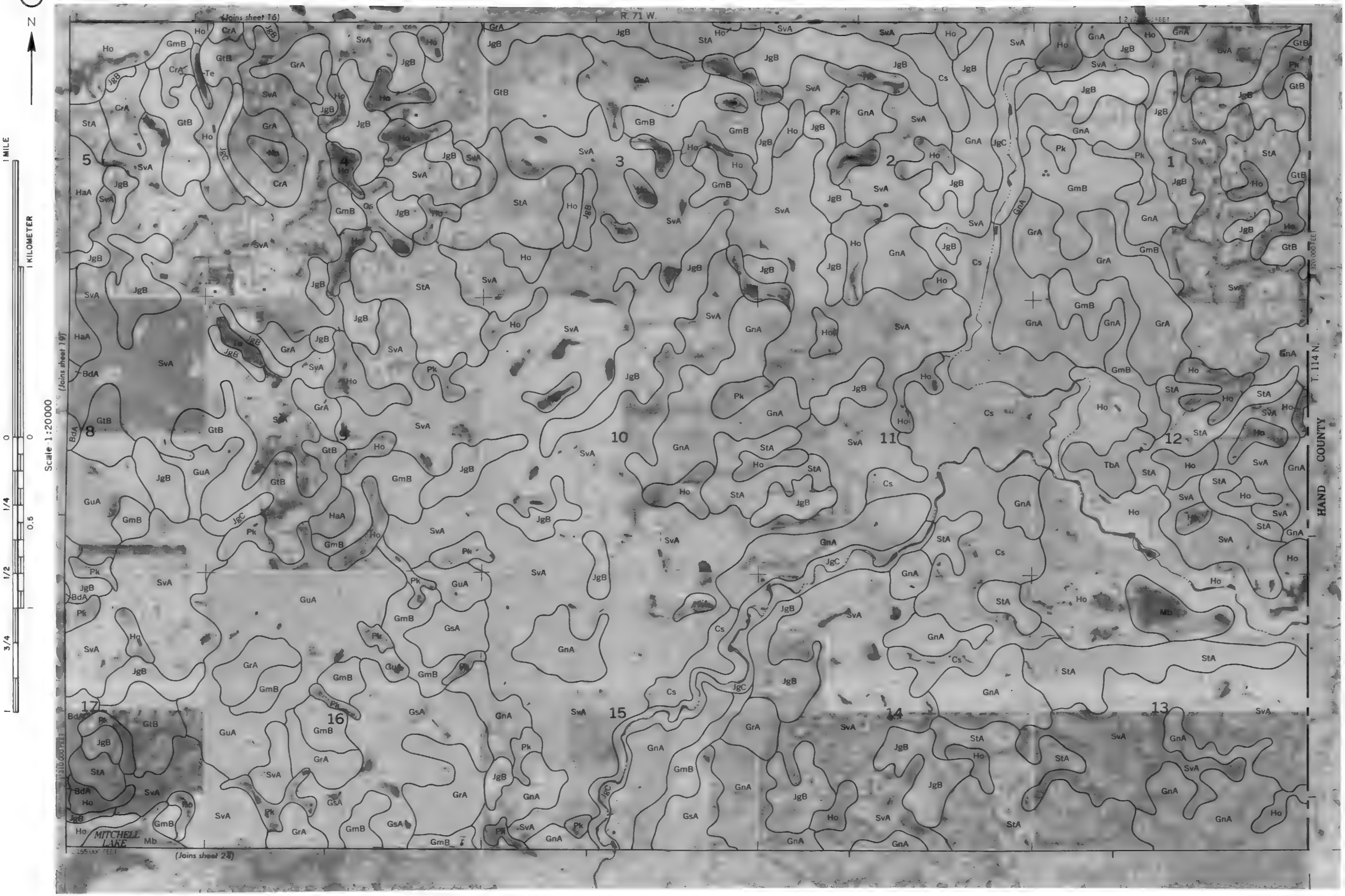

N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
0.5
1/2
3/4
(Joins sheet 12)
(Joins sheet 15)
(Joins sheet 20)
R. 71 W.
T. 115 N.
HAND COUNTY
2 175 000 FEET
340 000 FEET
2 155 000 FEET
320 000 FEET
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36


17
N
R. 73 W.
(Joins sheet 13)
(Joins sheet 18)
(Joins sheet 21)
SULLY COUNTY
T. 114 N.
2 105 000 FEET
1 MILE
1 KILOMETER
Scale 1:20000

18


N
1 MILE
1 KILOMETER
Scale 1:20 000
(Joins sheet 14)
R. 73 W.
R. 72 W.
2 130 000 FEET
(Joins sheet 17)
(Joins sheet 19)
T. 114 N.
(Joins sheet 22)
2 110 000 FEET


19
N
R. 72 W.
R. 71 W.
(Joins sheet 15)
(Joins sheet 20)
(Joins sheet 18)
(Joins sheet 23)
T. 114 N.
MITCHELL LAKE
1 MILE
1 KILOMETER
Scale 1:20000
2 135 000 FEET
2 155 000 FEET
320 000 FEET
310 000 FEET


N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 16)
R. 71 W.
(Joins sheet 19)
(Joins sheet 24)
T. 114 N.
HAND COUNTY
MITCHELL LAKE
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

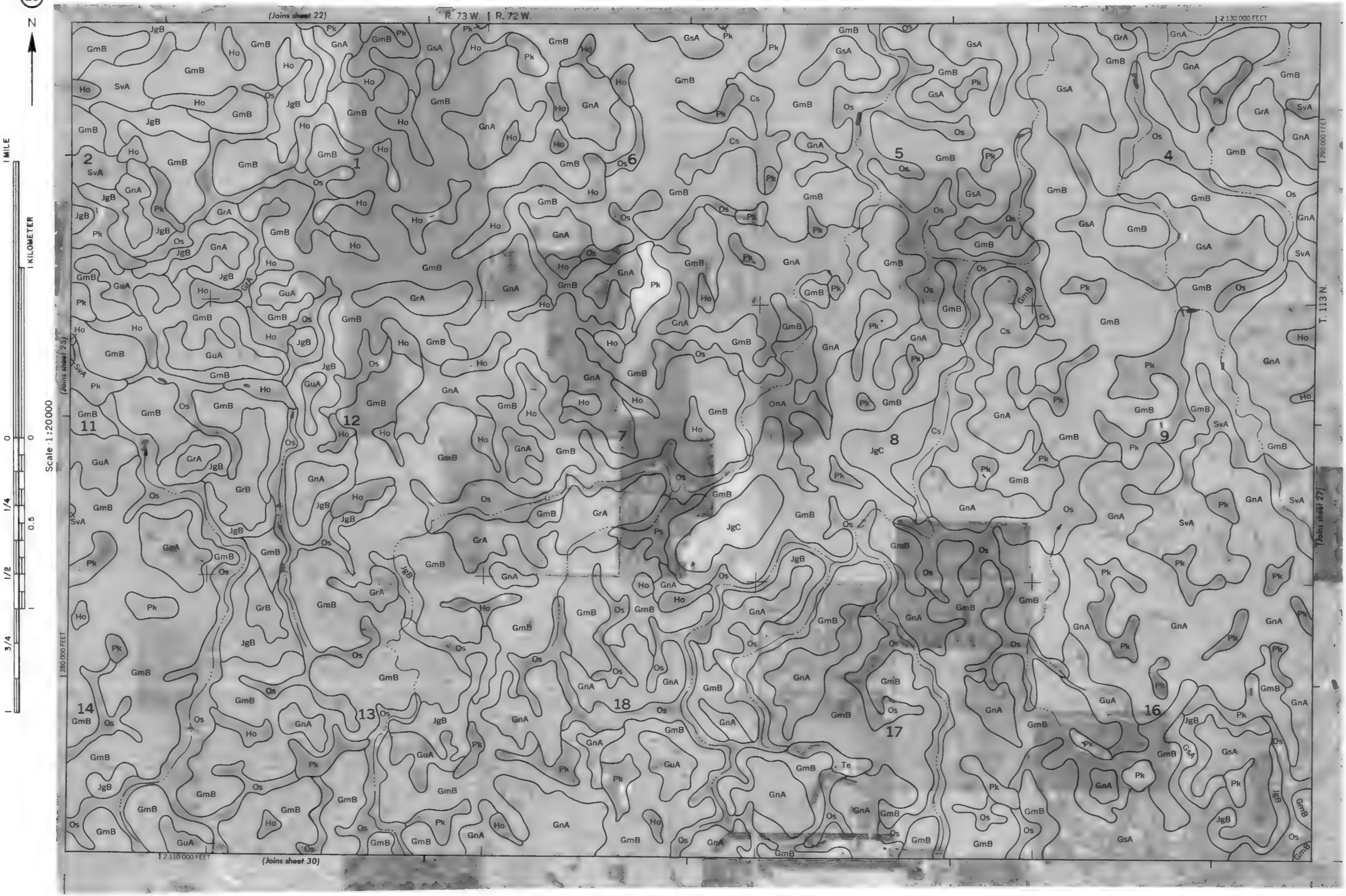

21
N
R. 73 W.
(Joins sheet 17)
(Joins sheet 22)
(Joins sheet 25)
T. 114 N.
SULLY COUNTY
2 095 000 FEET
105 000 FEET
290 000 FEET
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:20000


22
N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0
0.5
(Joins sheet 18)
R. 73 W.
R. 72 W.
2 130 000 FEET
305 000 FEET
T. 114 N.
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 26)
2 110 000 FEET
280 000 FEET
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36
GmB
GsA
GnA
GrA
Pk
Os
Ho
JgB
JgC
JaC
GuA
TcF
Ma
Te
Cs

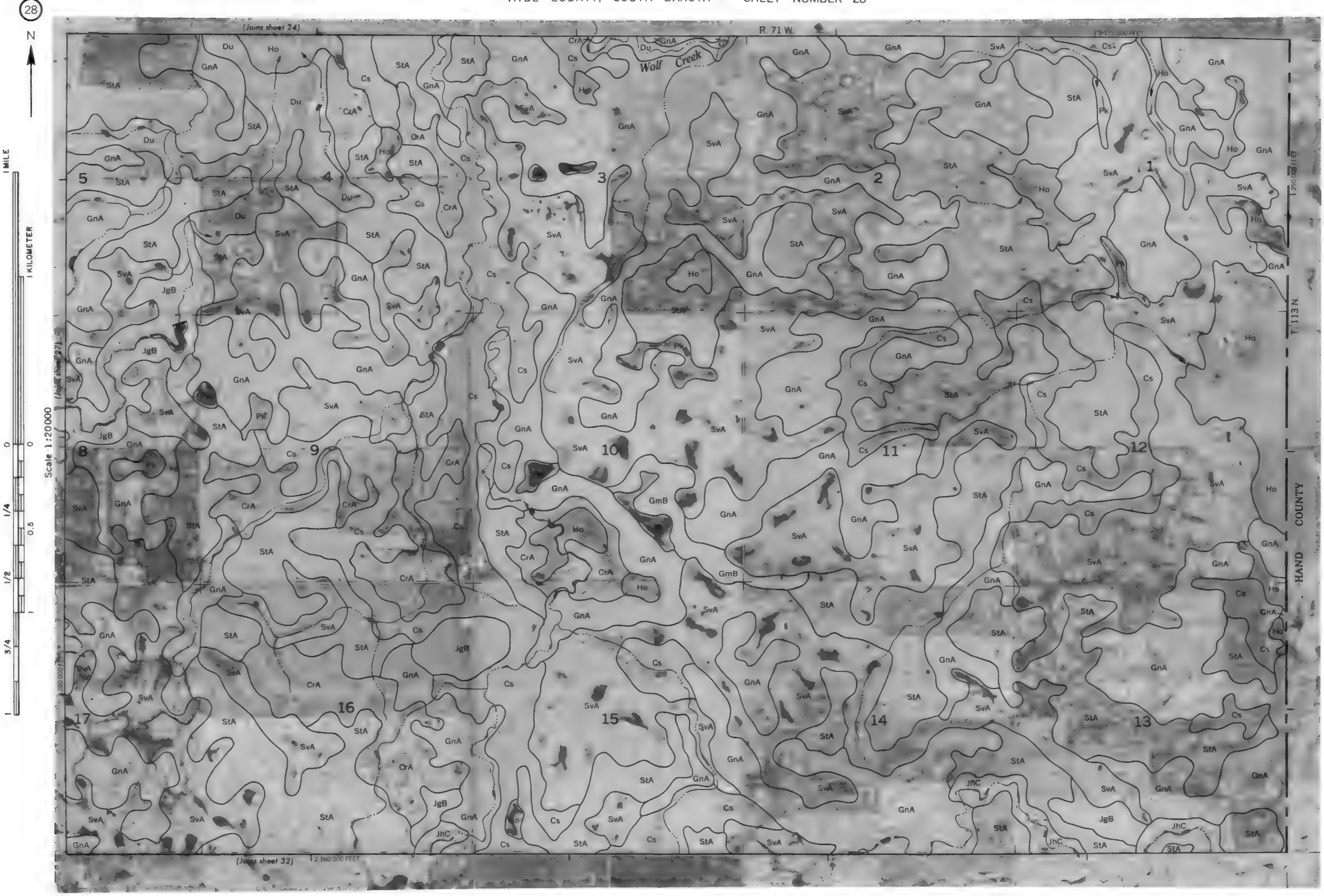

(Joins sheet 19)
(Joins sheet 22)
(Joins sheet 24)
(Joins sheet 27)
R. 72 W.
R. 71 W.
T. 114 N.
2 135 000 FEET
2 155 000 FEET
305 000 FEET
MITCHELL LAKE
19
20
22
23
24
25
26
27
29
30
31
32
34
35
36
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:20000
47
GnA
GmB
Cs
Ho
SvA
JgB
GrB
CrA
GsA
GuA
Mb
BdA
Du
Pk
StA
Te
JgC
GrA
Bn
BkE
Os

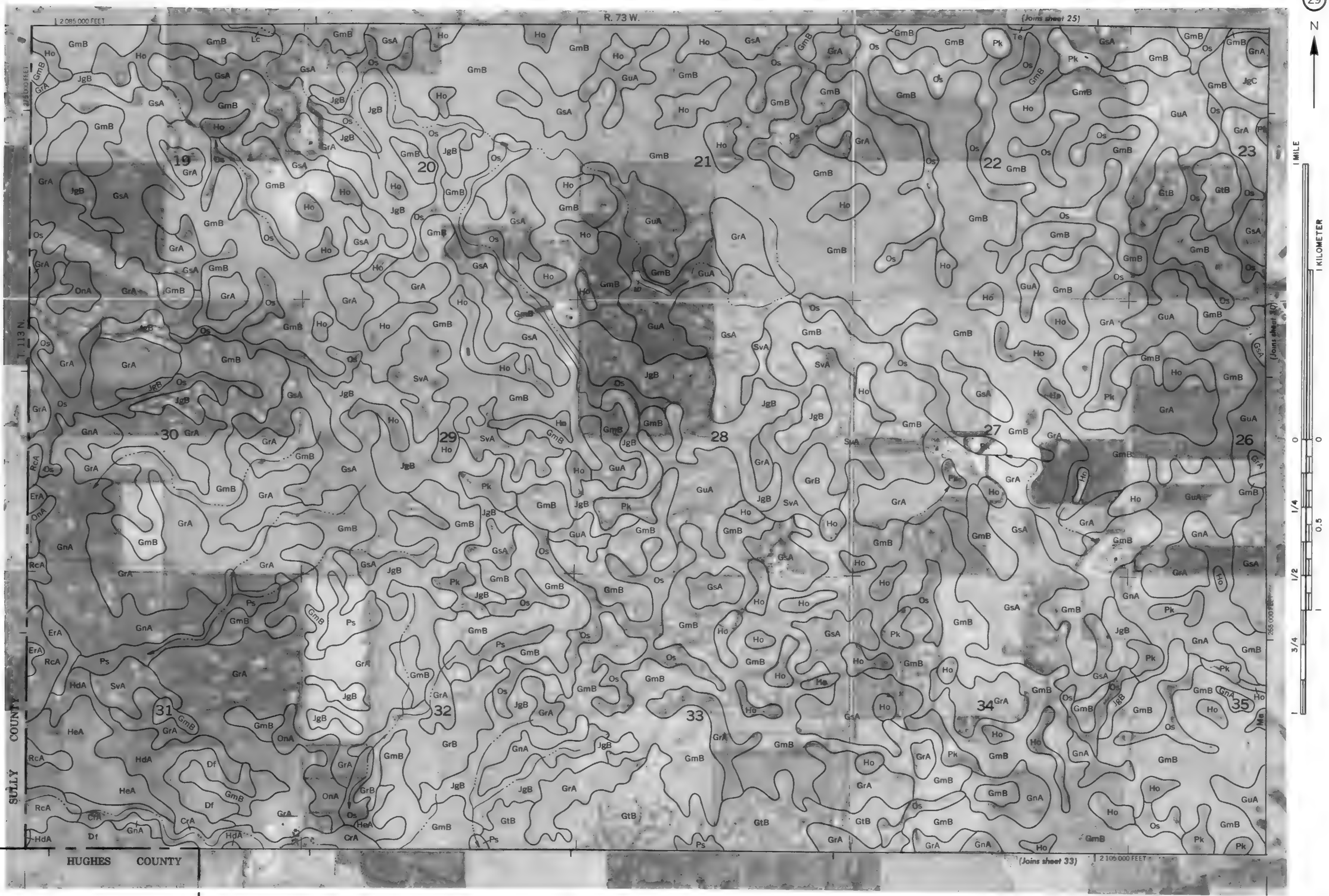

N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 20)
R. 71 W.
2 175 000 FEET
MITCHELL LAKE
(Joins sheet 23)
(Joins sheet 28)
2 150 000 FEET
T. 114 N.
HAND COUNTY
Wolf Creek
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36

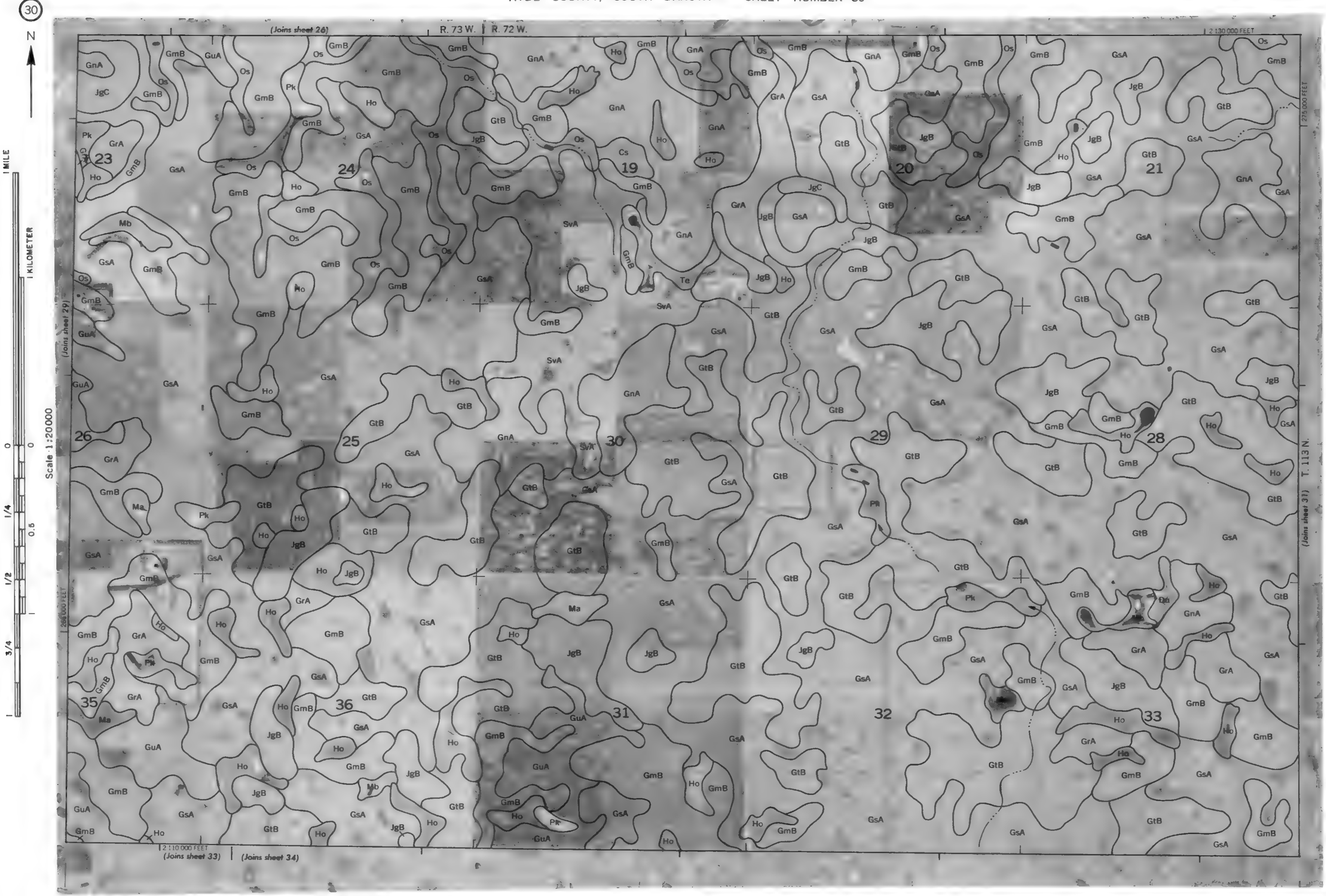

25
N
R. 73 W.
2 085 000 FEET
290 000 FEET
(Joins sheet 21)
(Joins sheet 26)
(Joins sheet 29)
105 000 FEET
280 000 FEET
T. 113 N.
SULLY COUNTY
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:20000


26
N
1 MILE
1 KILOMETER
Scale 1:20000
(Joins sheet 22)
R. 73 W.
R. 72 W.
2 130 000 FEET
290 000 FEET
T. 113 N.
(Joins sheet 25)
(Joins sheet 27)
280 000 FEET
2 110 000 FEET
(Joins sheet 30)

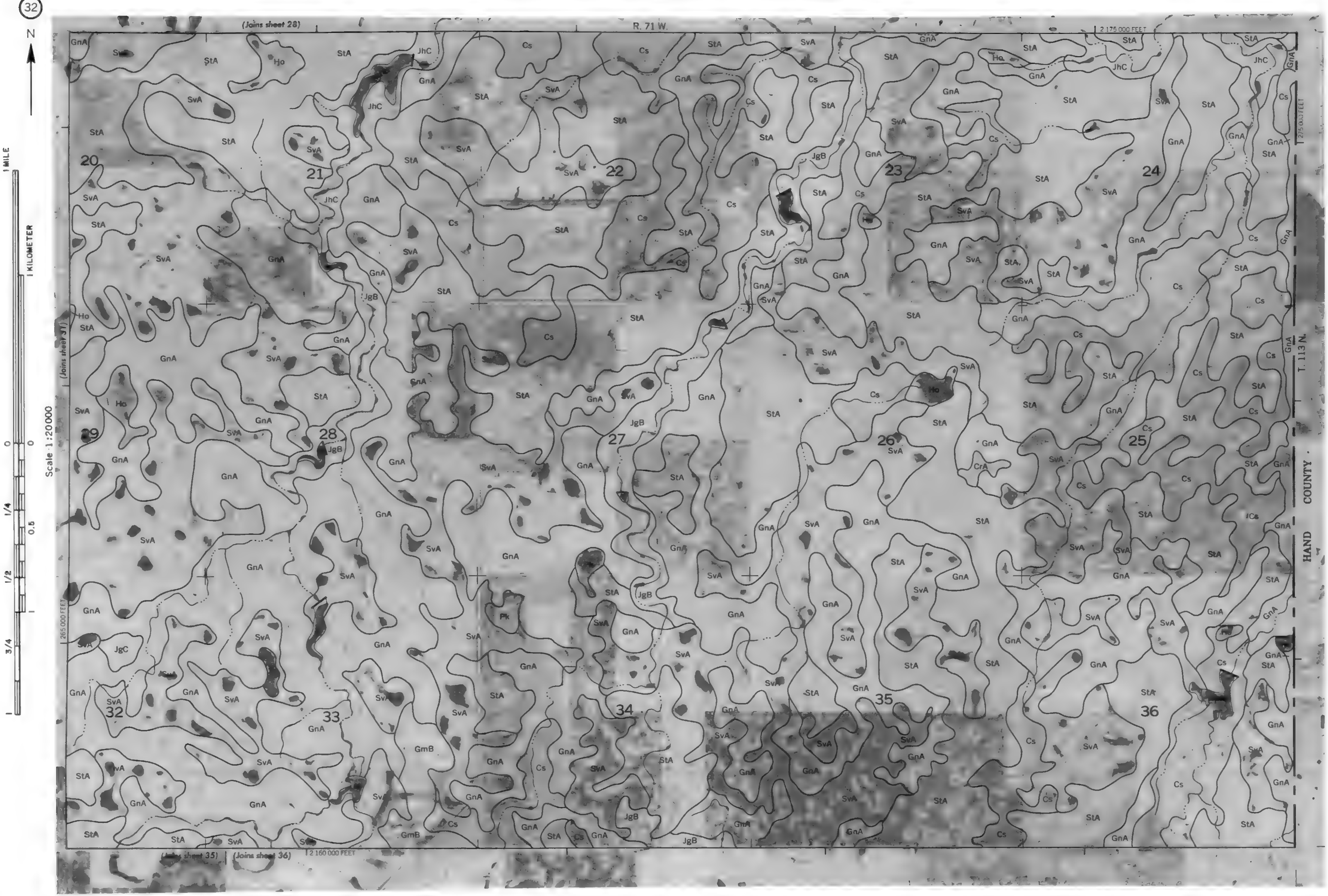

27
N
(Joins sheet 23)
R. 72 W.
R. 71 W.
2 135 000 FEET
T. 113 N.
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 31)
2 155 000 FEET
280 000 FEET
1 MILE
1 KILOMETER
Scale 1:20000


28
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
Scale 1:20000
(Joins sheet 24)
(Joins sheet 32)
(Joins sheet 27)
R. 71 W.
T. 113 N.
HAND COUNTY
Wolf Creek
2 160 000 FEET
1 280 000 FEET
1 250 000 FEET
2 175 000 FEET

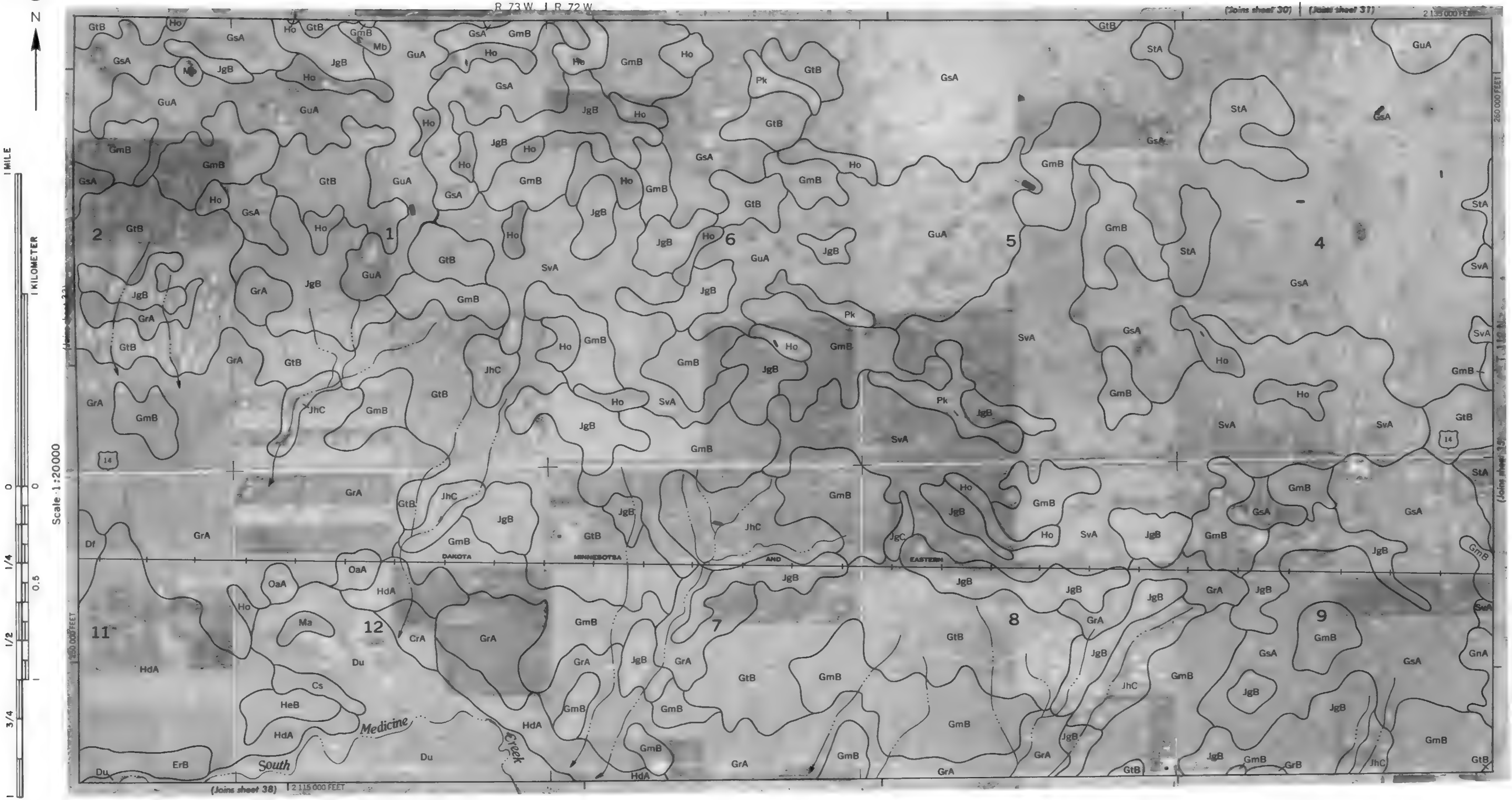

29
R. 73 W.
(Joins sheet 25)
(Joins sheet 33)
(Joins sheet 30)
T. 113 N.
SULLY COUNTY
HUGHES COUNTY
N
1 MILE
1 KILOMETER
Scale 1:20000
2 085 000 FEET
2 105 000 FEET
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35


30
N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0
0.5
(Joins sheet 26)
R. 73 W.
R. 72 W.
2 130 000 FEET
275 000 FEET
(Joins sheet 29)
(Joins sheet 31)
T. 113 N.
260 000 FEET
2 110 000 FEET
(Joins sheet 33)
(Joins sheet 34)
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36


31
N
R. 72 W.
R. 71 W.
(Joins sheet 27)
(Joins sheet 32)
(Joins sheet 30)
(Joins sheet 34)
(Joins sheet 35)
T. 113 N.
2 135 000 FEET
275 000 FEET
265 000 FEET
2 155 000 FEET
1 MILE
1 KILOMETER
Scale 1:20000
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32

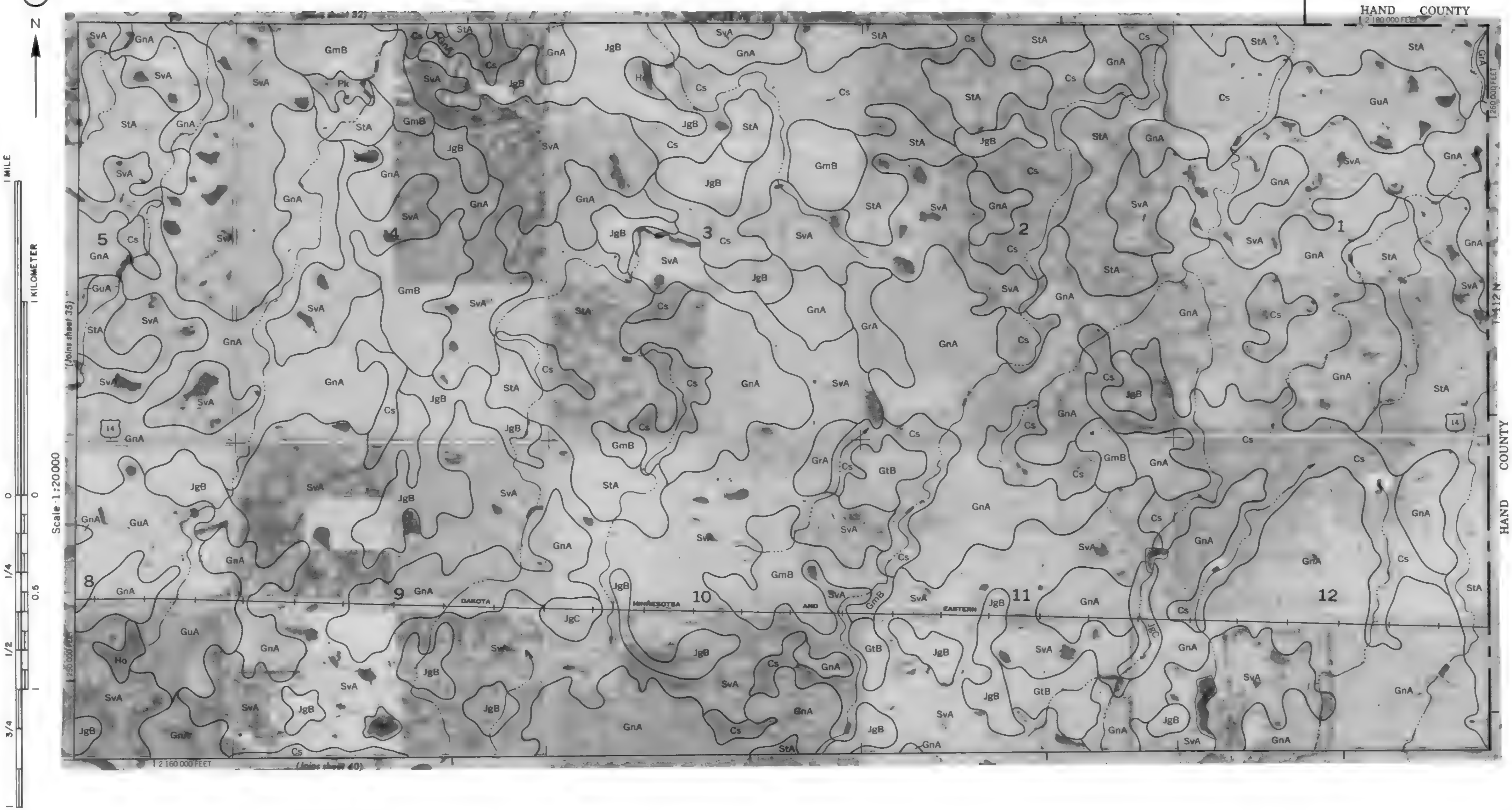

32
N
(Joins sheet 28)
R. 71 W.
2 175 000 FEET
275 000 FEET
(Joins sheet 31)
T. 113 N.
HAND COUNTY
265 000 FEET
(Joins sheet 35)
(Joins sheet 36)
2 160 000 FEET
Scale 1:20 000
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
20
21
22
23
24
29
28
27
26
25
32
33
34
35
36


2 090 000 FEET
R. 73 W.
(Joins sheet 29)
(Joins sheet 30)
(Joins sheet 34)
(Joins sheet 37)
2 110 000 FEET
260 000 FEET
250 000 FEET
T. 112 N.
HUGHES COUNTY
Holabird
DAKOTA MINNESOTA AND EASTERN
South Medicine Creek
N
1 MILE
1 KILOMETER
Scale 1:20000

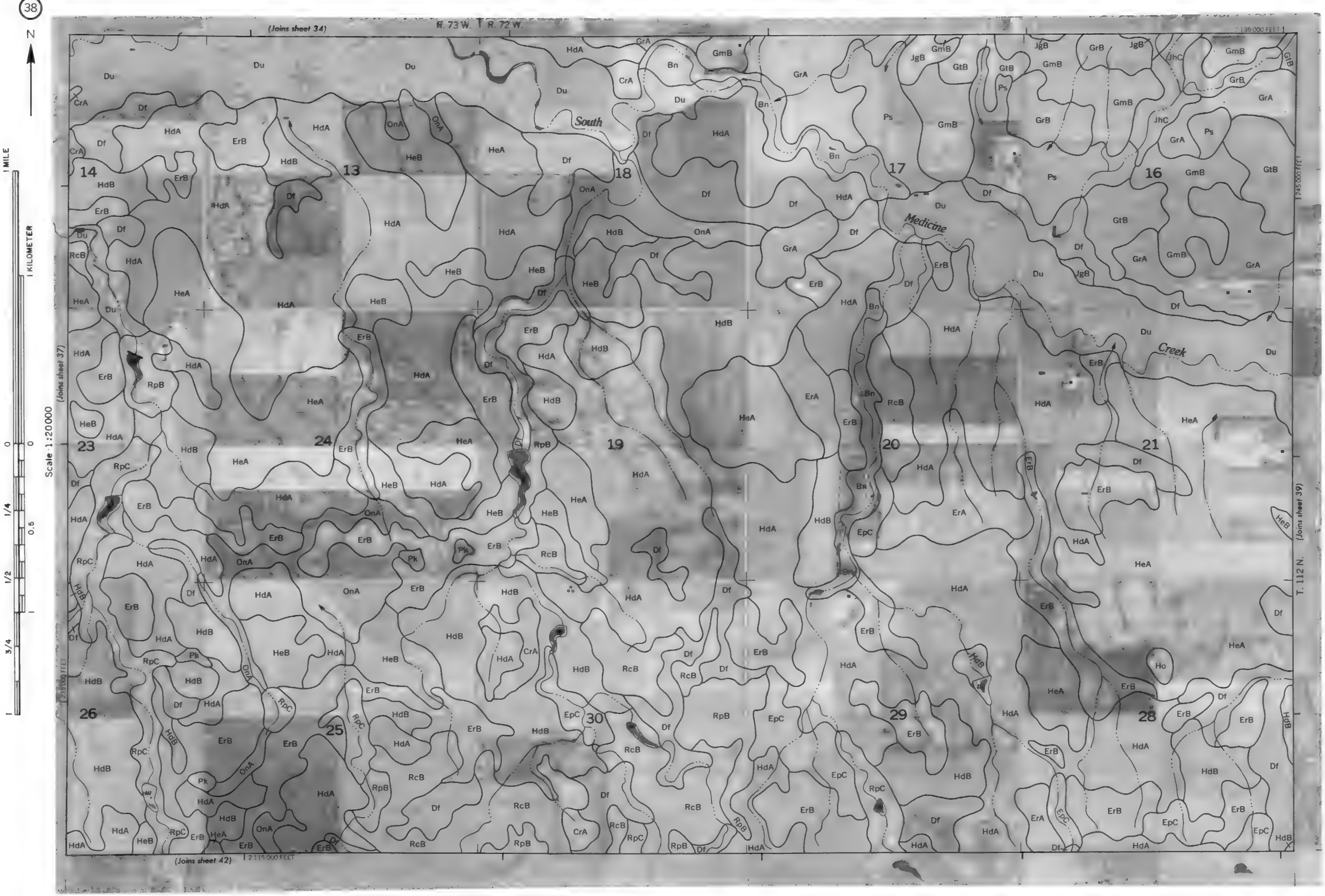

N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
Scale 1:20000
R. 73 W. | R. 72 W.
(Joins sheet 30)
(Joins sheet 31)
(Joins sheet 35)
(Joins sheet 38)
2 115 000 FEET
260 000 FEET
DAKOTA MINNESOTA AND EASTERN
Medicine
South
Creek
14
1
2
4
5
6
7
8
9
11
12

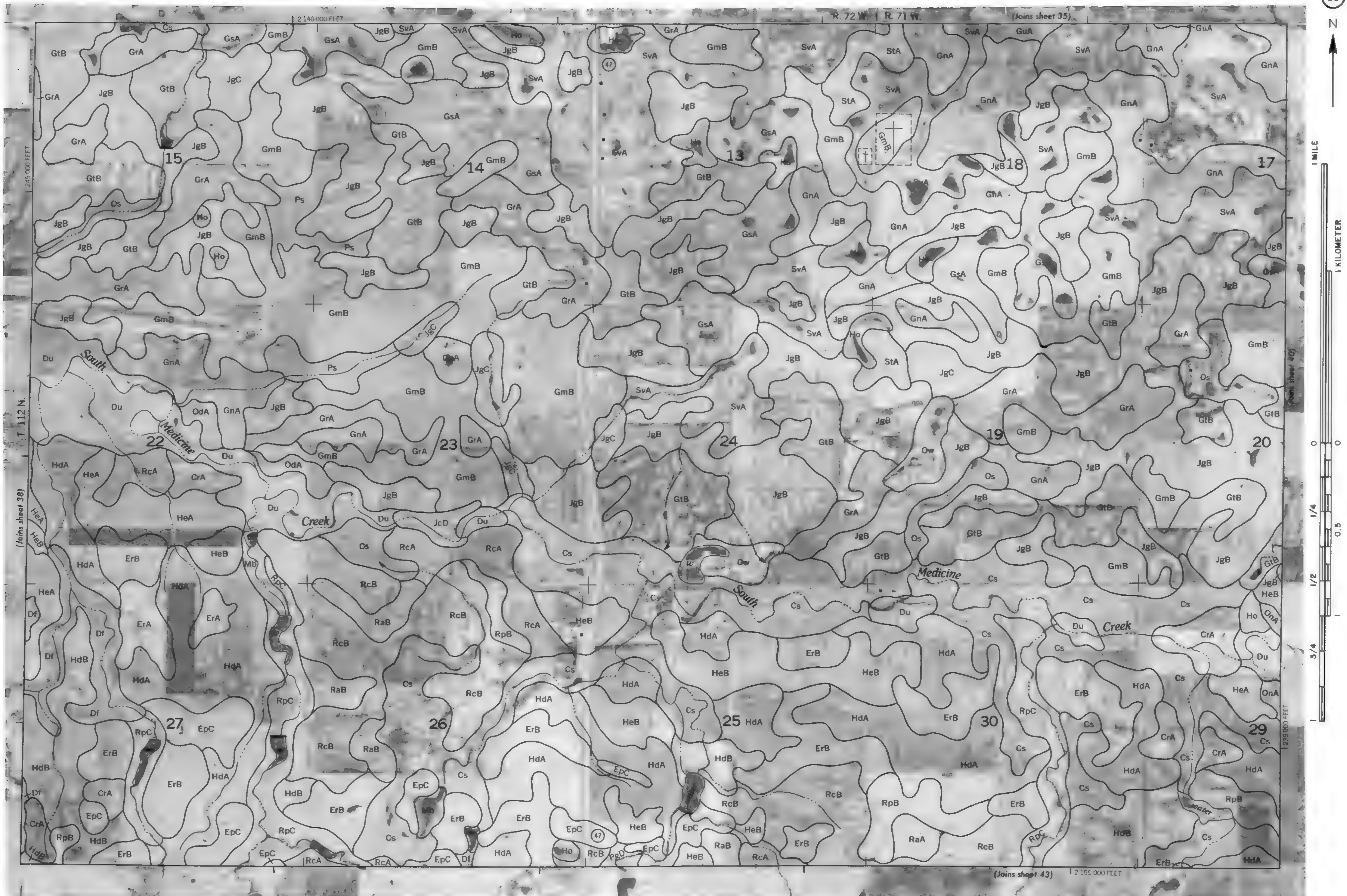

R. 72 W. | R. 71 W.
(Joins sheet 31)
(Joins sheet 32)
(Joins sheet 36)
N
1 MILE
1 KILOMETER
Scale 1:20000
HIGHMORE
(county seat)
MINNESOTA AND EASTERN
LANDFILL
SEWAGE LAGOON

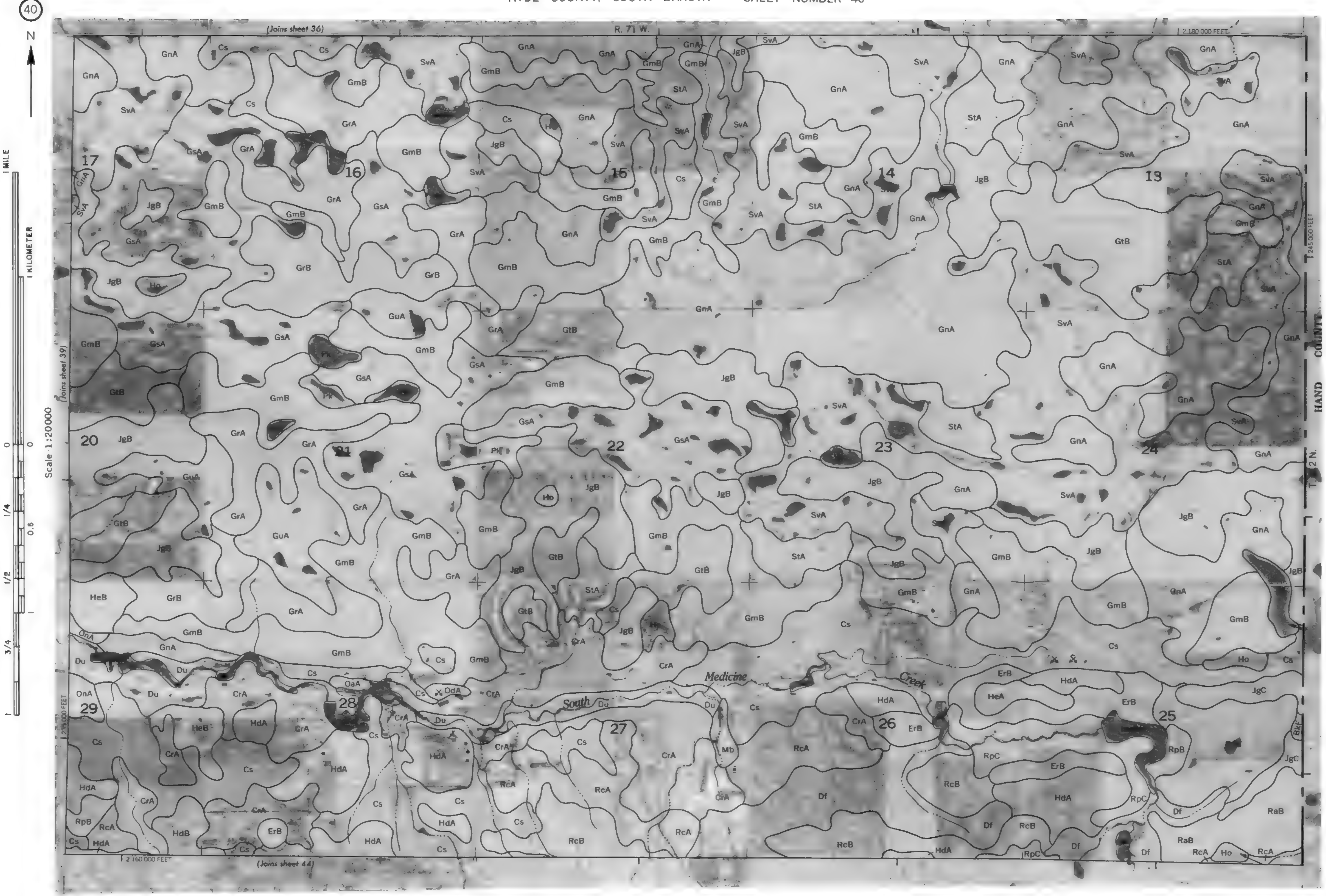
36


N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0
0.5
(Joins sheet 32)
(Joins sheet 35)
(Joins sheet 40)
HAND COUNTY
HAND COUNTY
2 180 000 FEET
2 160 000 FEET
260 000 FEET
250 000 FEET
T. 112 N.
DAKOTA MINNESOTA AND EASTERN
14
14
1
2
3
4
5
8
9
10
11
12


37
N
R. 73 W.
2 090 000 FEET
(Joins sheet 33)
(Joins sheet 38)
(Joins sheet 41)
2 110 000 FEET
245 000 FEET
235 000 FEET
T. 112 N.
HUGHES COUNTY
South Medicine Creek
14
15
16
17
18
19
20
21
22
23
26
27
28
29
30
1 MILE
1 KILOMETER
Scale 1:20000

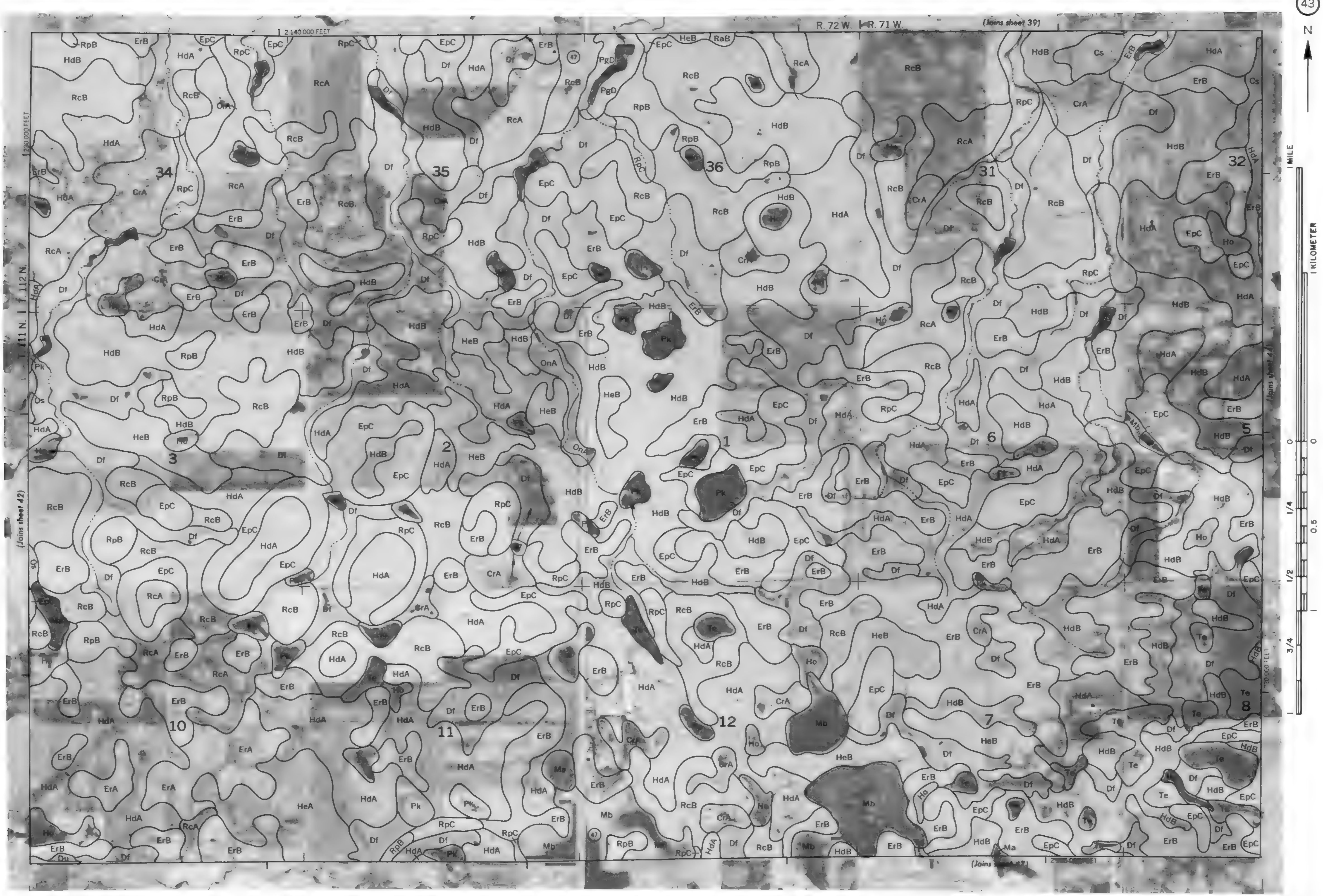

38
N
(Joins sheet 34)
R. 73 W. R. 72 W.
2 135 000 FEET
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 42)
2 115 000 FEET
245 000 FEET
T. 112 N.
South
Medicine
Creek
14
13
18
17
16
23
24
19
20
21
26
25
30
29
28
Scale 1:20000
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5


2 140 000 FEET
R. 72 W. | R. 71 W.
(Joins sheet 35)
N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0
0.5
T. 112 N.
245 000 FEET
(Joins sheet 38)
(Joins sheet 40)
235 000 FEET
(Joins sheet 43)
2 155 000 FEET
South Medicine Creek
15
14
13
18
17
22
23
24
19
20
27
26
25
30
29
47

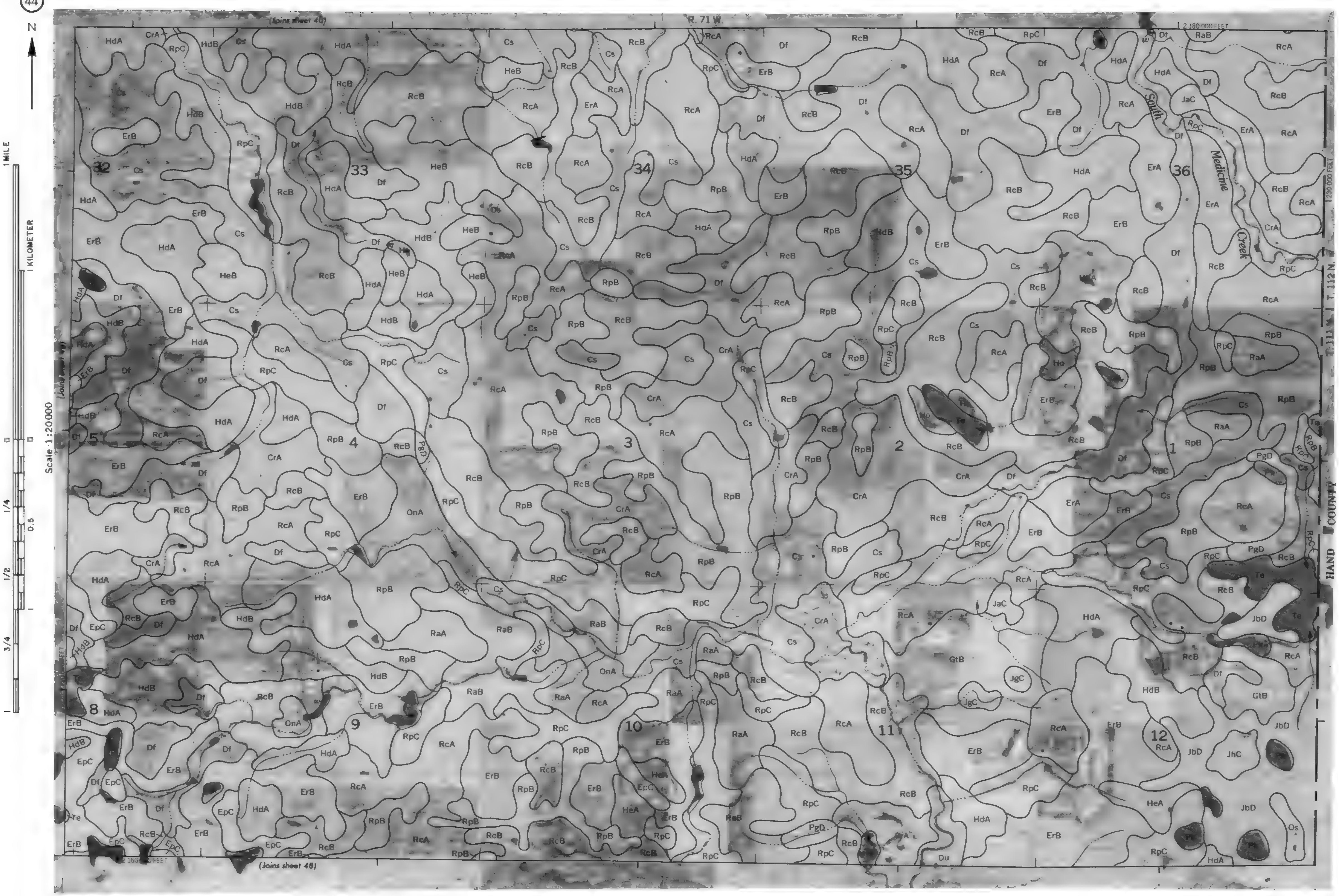

40
N
1 MILE
1 KILOMETER
Scale 1:20000
(Joins sheet 36)
(Joins sheet 39)
(Joins sheet 44)
R. 71 W.
T. 112 N.
HAND COUNTY
2 180 000 FEET
2 160 000 FEET
Medicine Creek
South
13
14
15
16
17
20
21
22
23
24
25
26
27
28
29


R. 73 W.
(Joins sheet 37)
(Joins sheet 42)
(Joins sheet 45)
2 090 000 FEET
2 110 000 FEET
230 000 FEET
220 000 FEET
T. 112 N.
T. 111 N.
HUGHES COUNTY
N
1 MILE
1 KILOMETER
Scale 1:20000
31
32
33
34
35
6
5
4
3
2
7
8
9
10
11

HYDE COUNTY, SOUTH DAKOTA — SHEET NUMBER 42

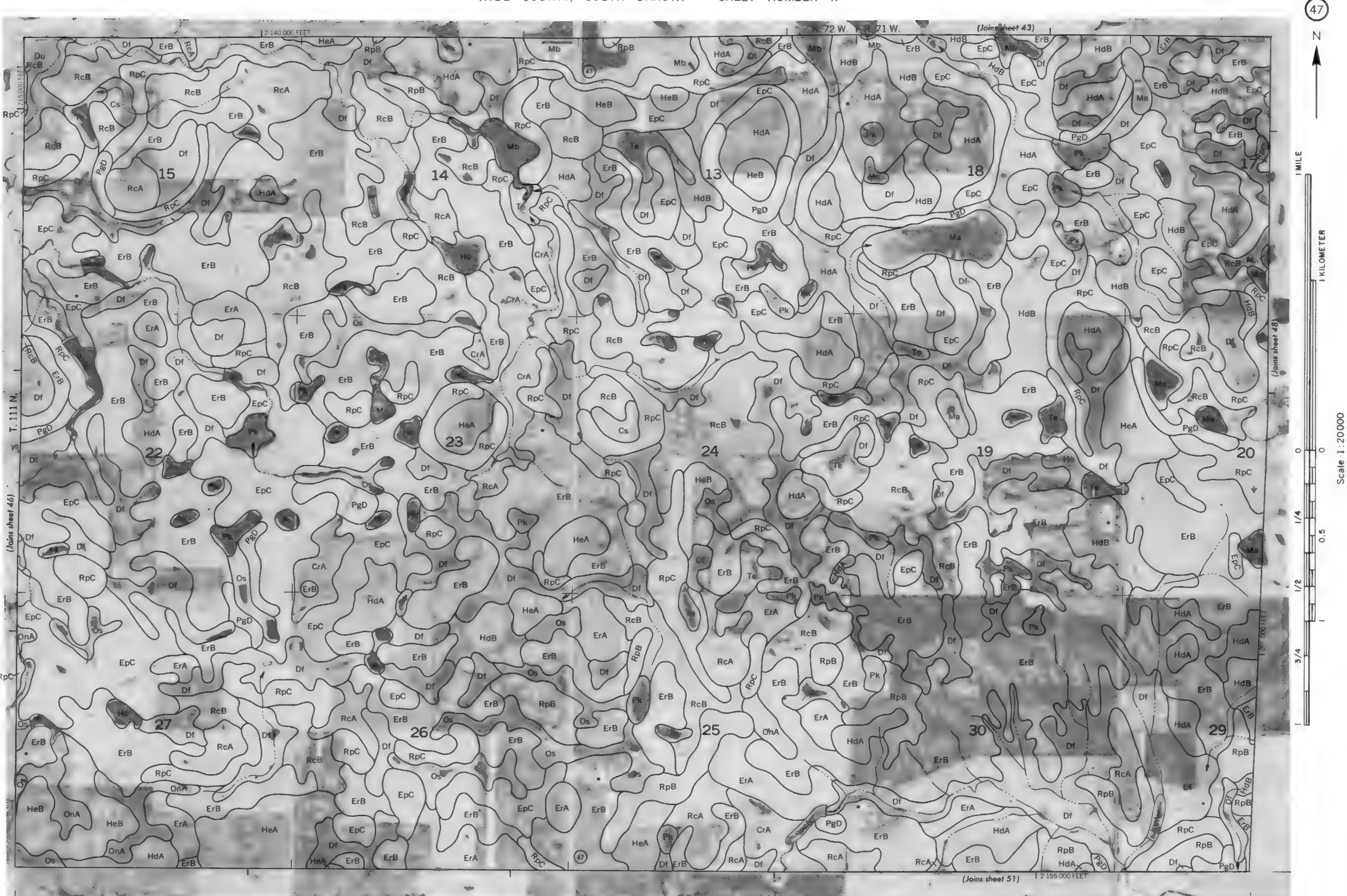

43
N
(Joins sheet 39)
R. 72 W.
R. 71 W.
2 140 000 FEET
T. 112 N.
T. 111 N.
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 47)
1 MILE
1 KILOMETER
Scale 1:20000
34
35
36
31
32
3
2
1
6
5
10
11
12
7
8

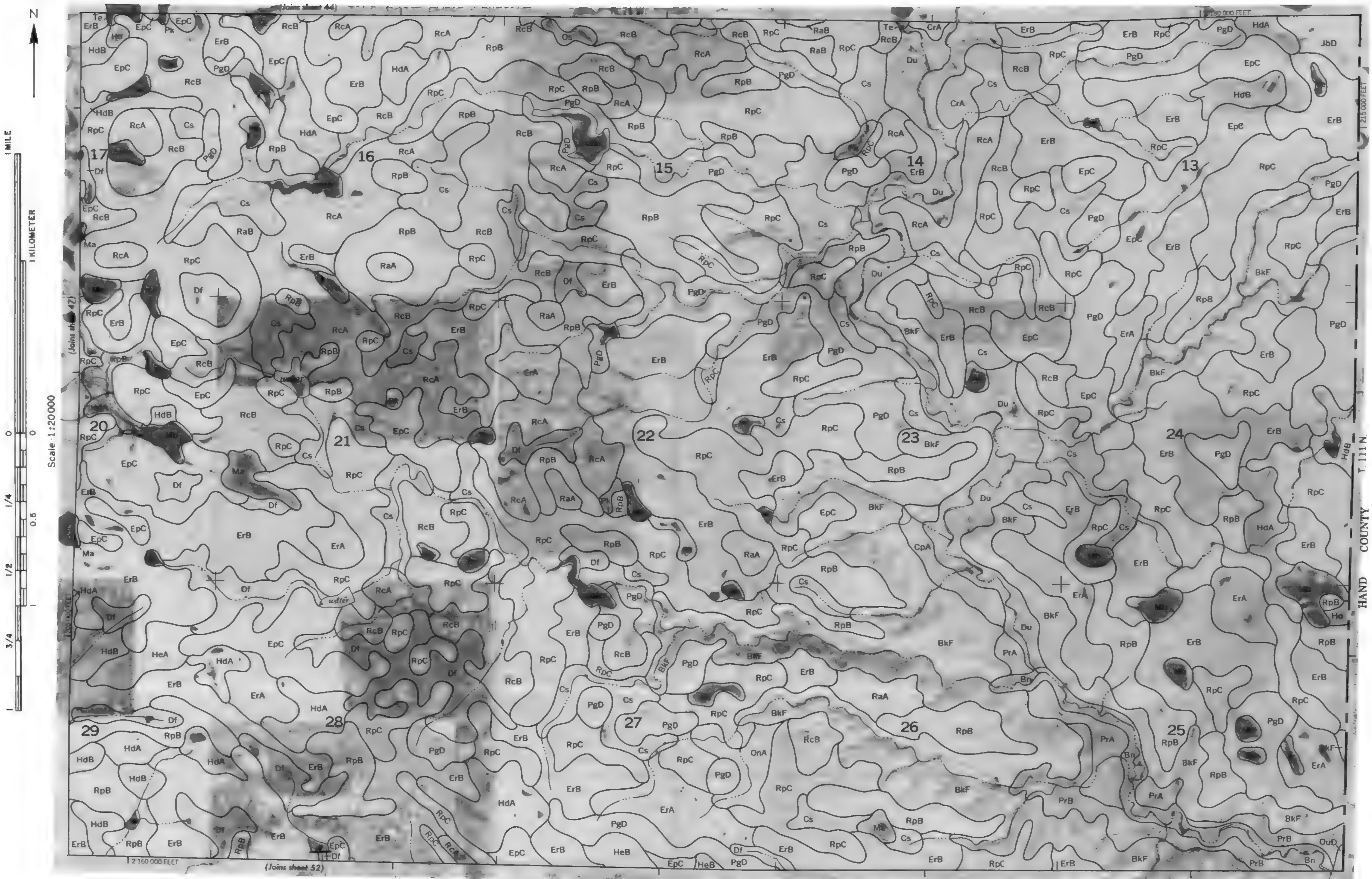
HYDE COUNTY, SOUTH DAKOTA — SHEET NUMBER 44




R. 73 W.
(Joins sheet 41)
(Joins sheet 46)
(Joins sheet 49)
HUGHES COUNTY
Chapelle Lake
Chapelle Creek
2 110 000 FEET
205 000 FEET
215 000 FEET
18
17
16
15
14
19
20
21
22
23
30
29
28
27
26
N
1 MILE
1 KILOMETER
Scale 1:20000

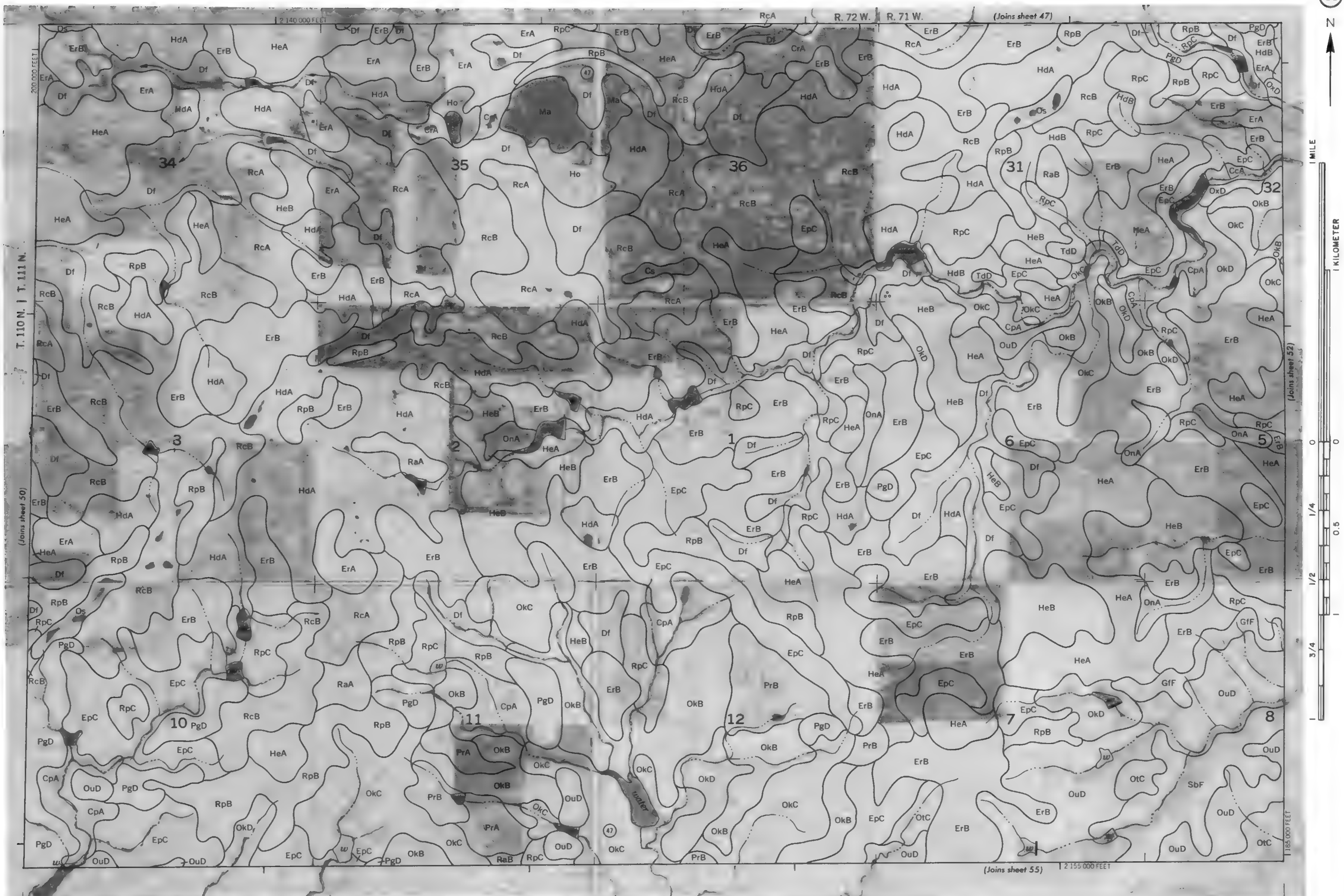

46
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
Scale 1:20 000
(Joins sheet 42)
(Joins sheet 45)
(Joins sheet 47)
(Joins sheet 50)
R. 73 W. | R. 72 W.
T. 111 N.
2 135 000 FEET
2 115 000 FEET
215 000 FEET
205 000 FEET
13
14
16
17
18
19
20
21
23
24
25
26
28
29
30
water

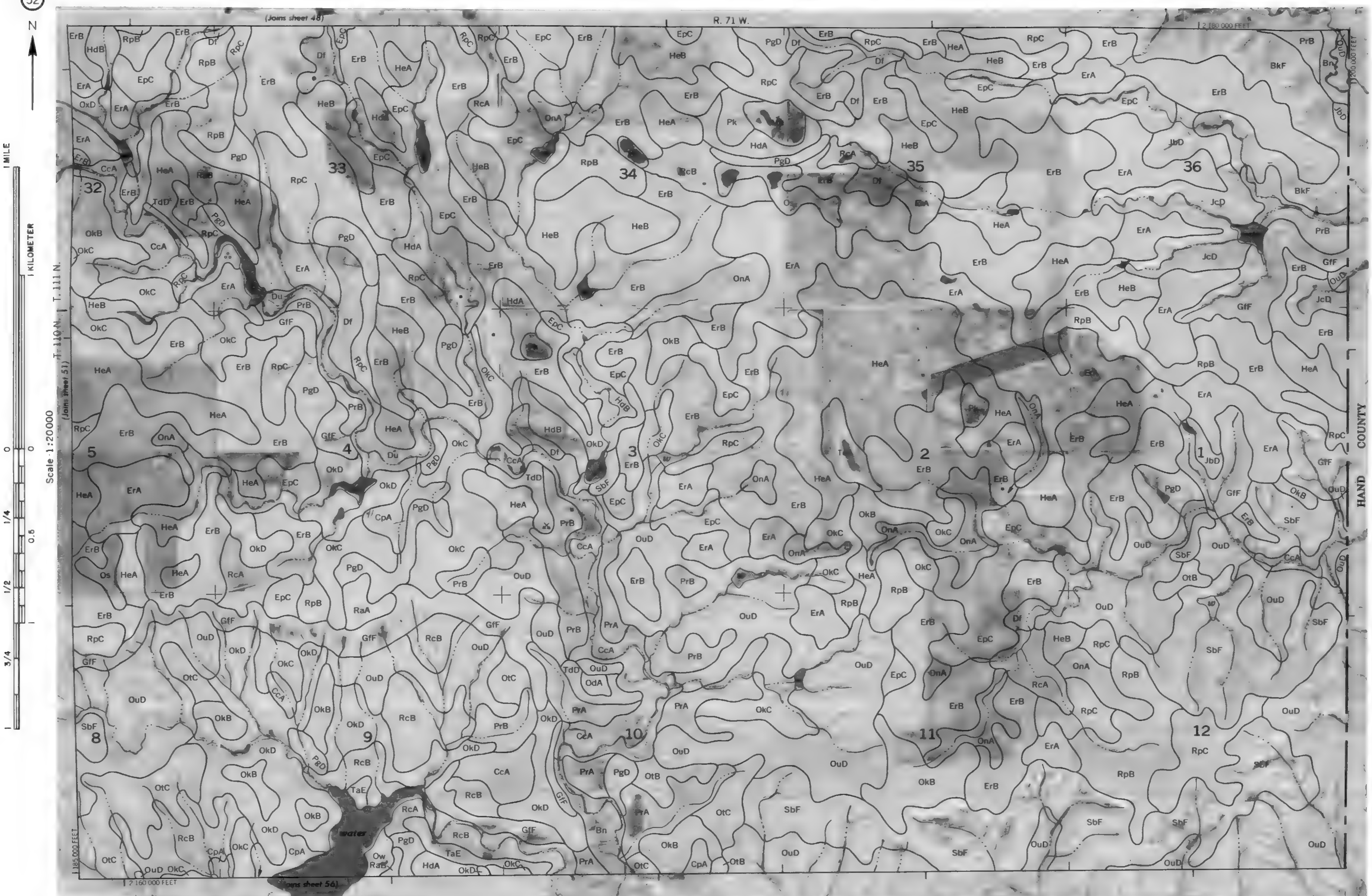

47
N
(Joins sheet 43)
R. 72 W.
R. 71 W.
2 140 000 FEET
215 000 FEET
(Joins sheet 48)
(Joins sheet 46)
T. 111 N.
(Joins sheet 51)
2 155 000 FEET
200 000 FEET
13
14
15
17
18
19
20
22
23
24
25
26
27
29
30
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
Scale 1:20000

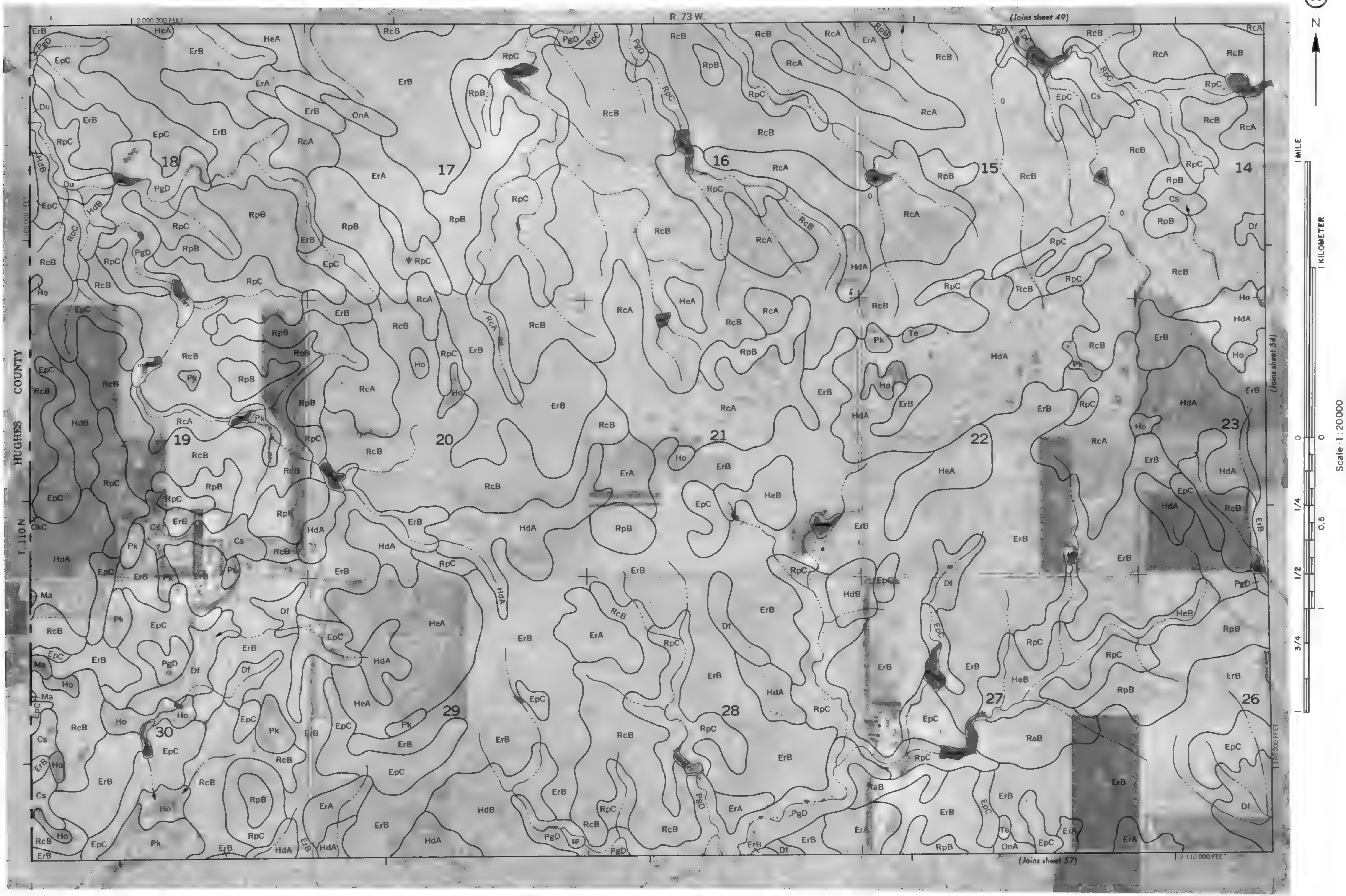

N
1 MILE
1 KILOMETER
Scale 1:20000
(Joins sheet 44)
(Joins sheet 47)
(Joins sheet 52)
2 180 000 FEET
215 000 FEET
2 160 000 FEET
HAND COUNTY
T. 111 N.
13
14
15
16
17
20
21
22
23
24
25
26
27
28
29

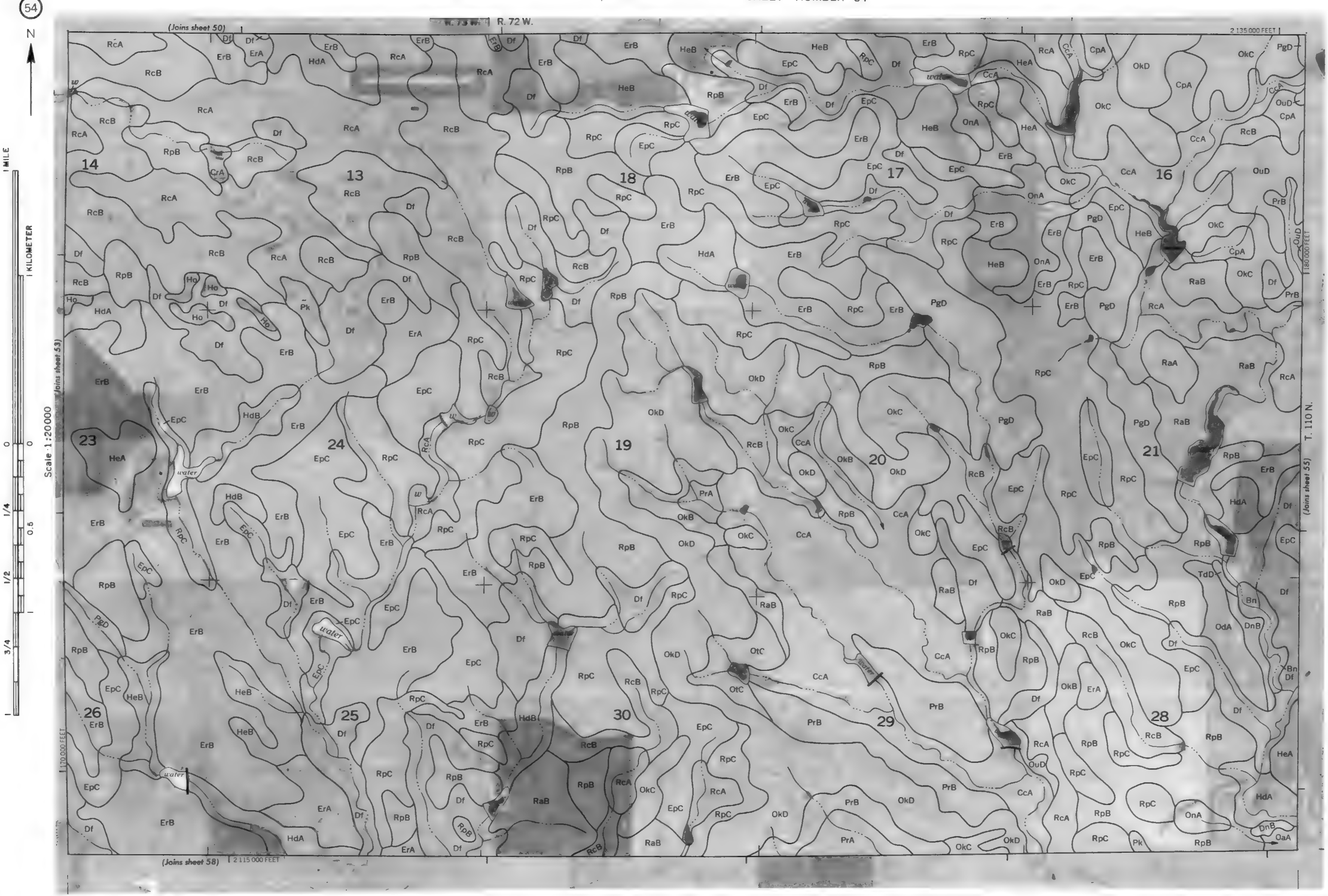
49
N
R. 73 W.
(Joins sheet 45)
(Joins sheet 50)
(Joins sheet 53)
2 090 000 FEET
2 110 000 FEET
200 000 FEET
185 000 FEET
T. 111 N.
T. 110 N.
HUGHES COUNTY
31
32
33
34
35
6
5
4
3
2
7
8
9
10
11
1 MILE
1 KILOMETER
Scale 1:20000

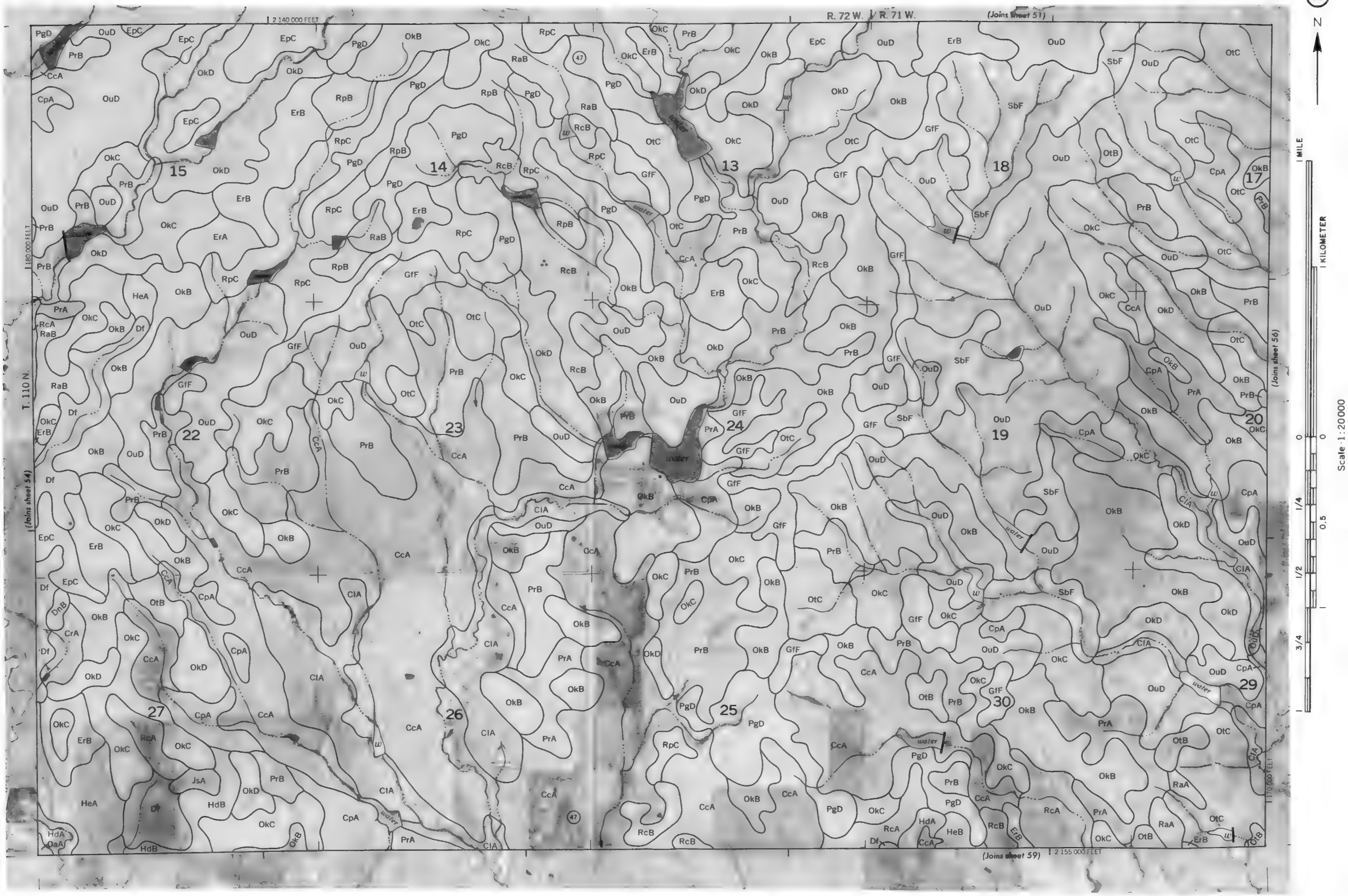

N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
0.5
1/2
3/4
1
(Joins sheet 46)
R. 73 W. | R. 72 W.
2 135 000 FEET
200 000 FEET
T. 111 N. | T. 110 N.
(Joins sheet 51)
(Joins sheet 49)
(Joins sheet 54)
2 115 000 FEET
185 000 FEET
35
36
31
32
33
2
1
6
5
4
11
12
7
8
9


51
R. 72 W.
R. 71 W.
(Joins sheet 47)
(Joins sheet 52)
(Joins sheet 55)
(Joins sheet 50)
T. 110 N. | T. 111 N.
2 140 000 FEET
2 155 000 FEET
200 000 FEET
185 000 FEET
1 MILE
1 KILOMETER
Scale 1:20000
34
35
36
31
32
3
2
1
6
5
10
11
12
7
8
water

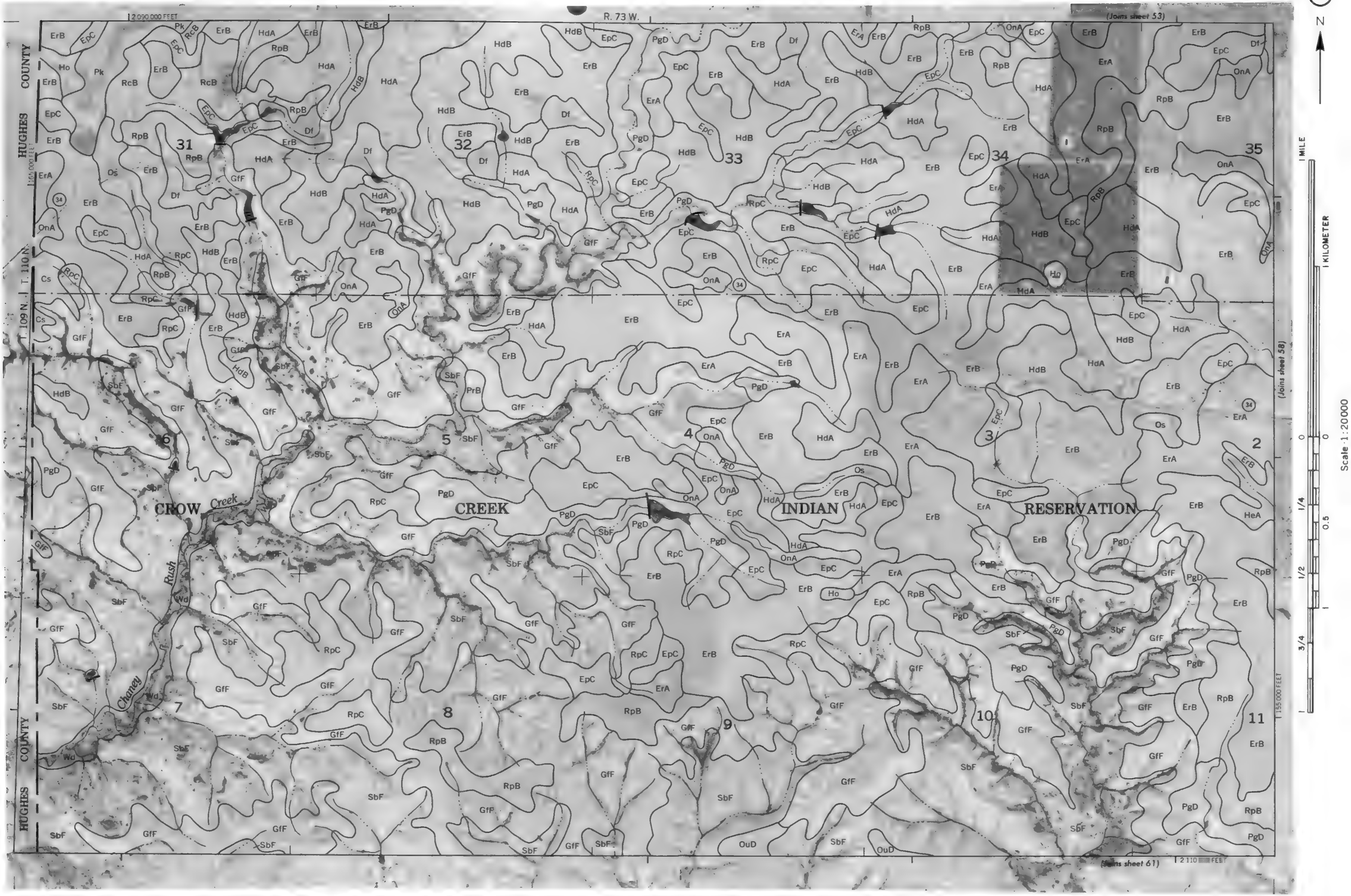

52
N
(Joins sheet 48)
R. 71 W.
(Joins sheet 51)
(Joins sheet 56)
T. 111 N.
T. 110 N.
HAND COUNTY
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
0.5
2 180 000 FEET
2 160 000 FEET
185 000 FEET
32
33
34
35
36
5
4
3
2
1
8
9
10
11
12
water

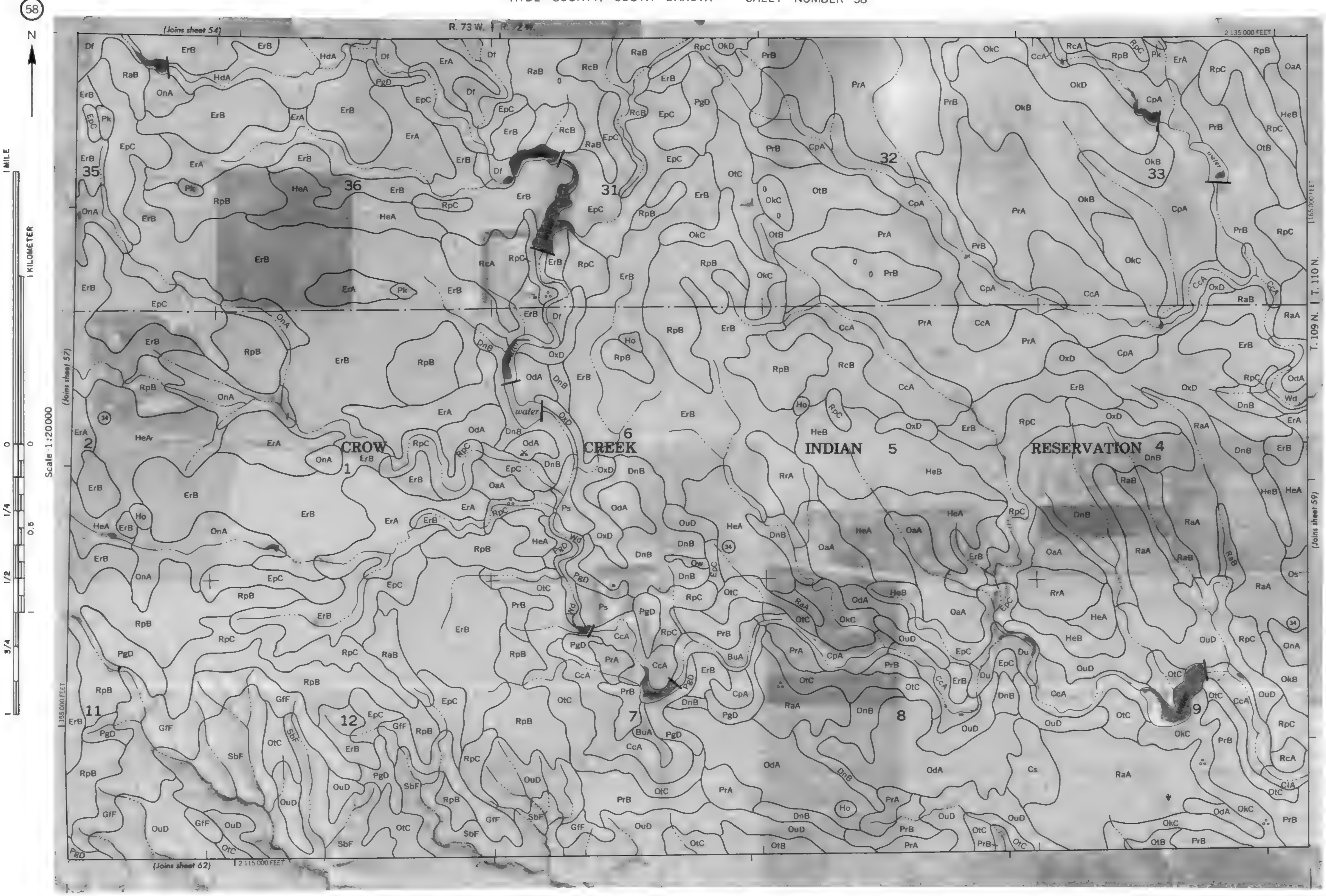

53
N
R. 73 W.
(Joins sheet 49)
(Joins sheet 54)
(Joins sheet 57)
HUGHES COUNTY
T. 110 N.
2 090 000 FEET
2 110 000 FEET
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0.5
14
15
16
17
18
19
20
21
22
23
26
27
28
29
30

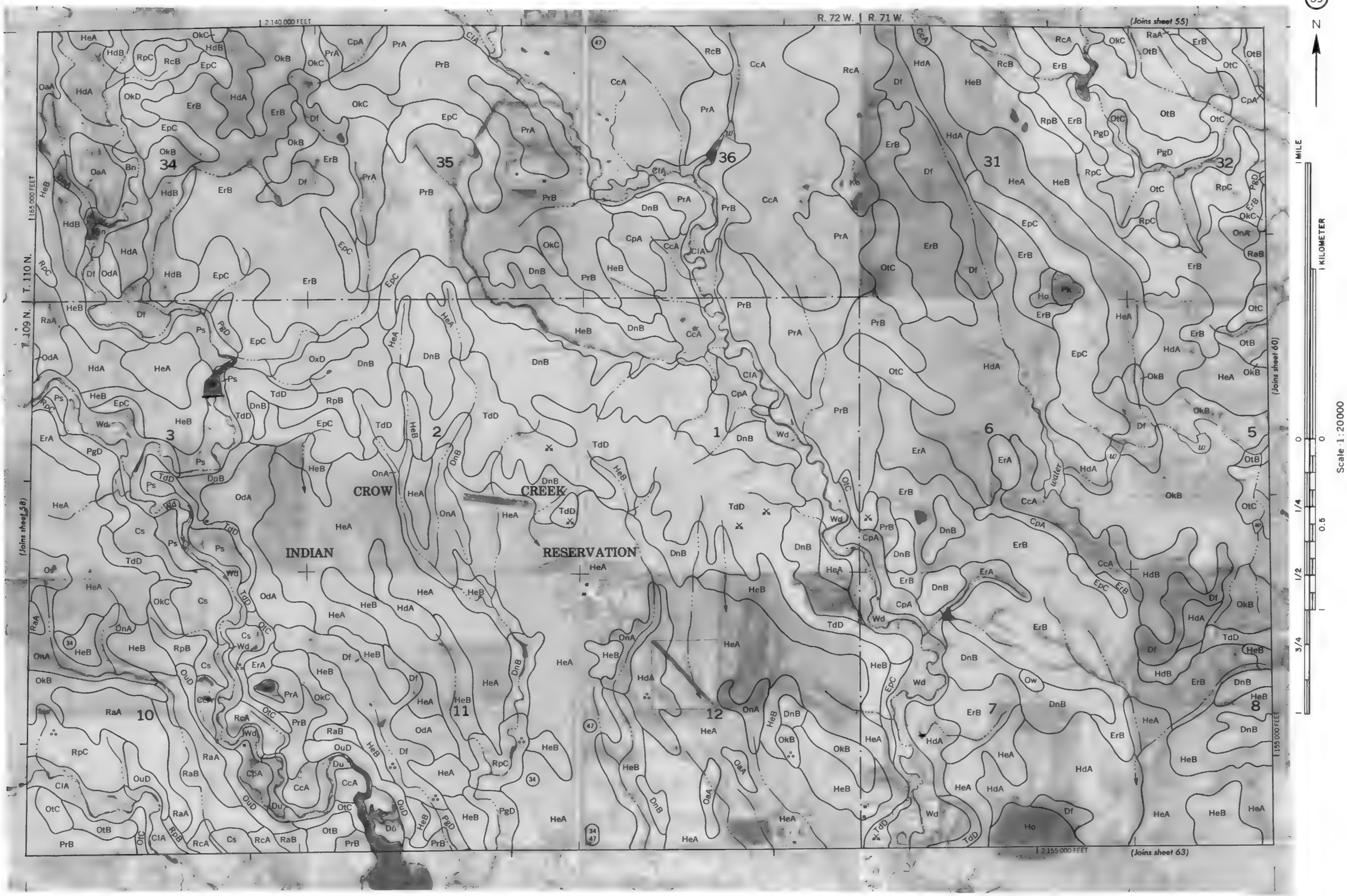

N
(Joins sheet 50)
R. 72 W.
2 135 000 FEET
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0
0.5
1
Scale 1:20000
(Joins sheet 53)
(Joins sheet 55)
T. 110 N.
180 000 FEET
170 000 FEET
(Joins sheet 58)
2 115 000 FEET
13
14
16
17
18
19
20
21
23
24
25
26
28
29
30
water

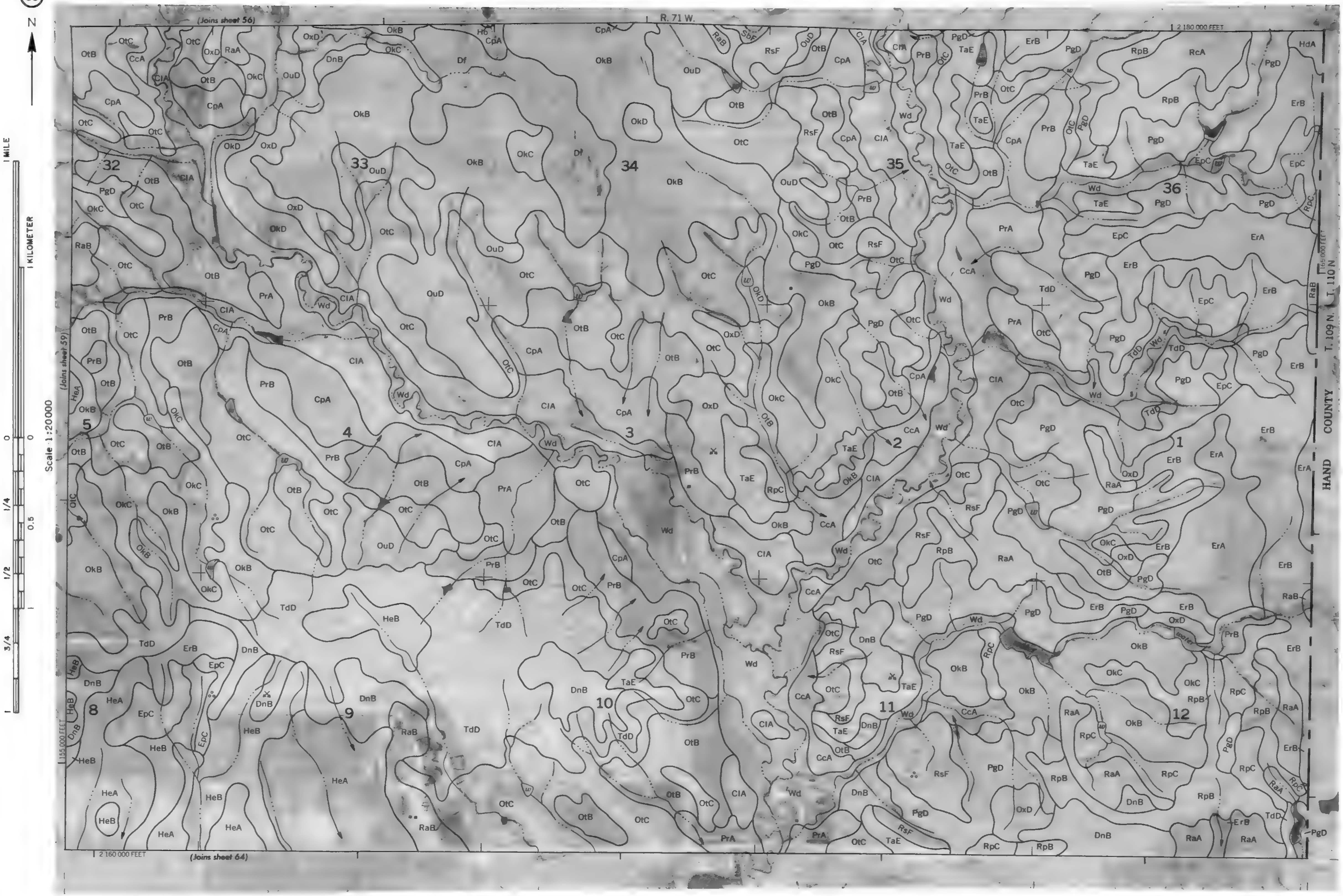

55
N
2 140 000 FEET
R. 72 W.
R. 71 W.
(Joins sheet 51)
T. 110 N.
180 000 FEET
(Joins sheet 54)
(Joins sheet 56)
170 000 FEET
(Joins sheet 59)
2 155 000 FEET
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0.5
water
13
14
15
17
18
19
20
22
23
24
25
26
27
29
30


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:20000
(Joins sheet 52)
R. 71 W.
2 180 000 FEET
185 000 FEET
T. 110 N.
HAND COUNTY
(Joins sheet 55)
(Joins sheet 60)
2 160 000 FEET
water
13
14
15
16
17
20
21
22
23
24
25
26
27
28
29

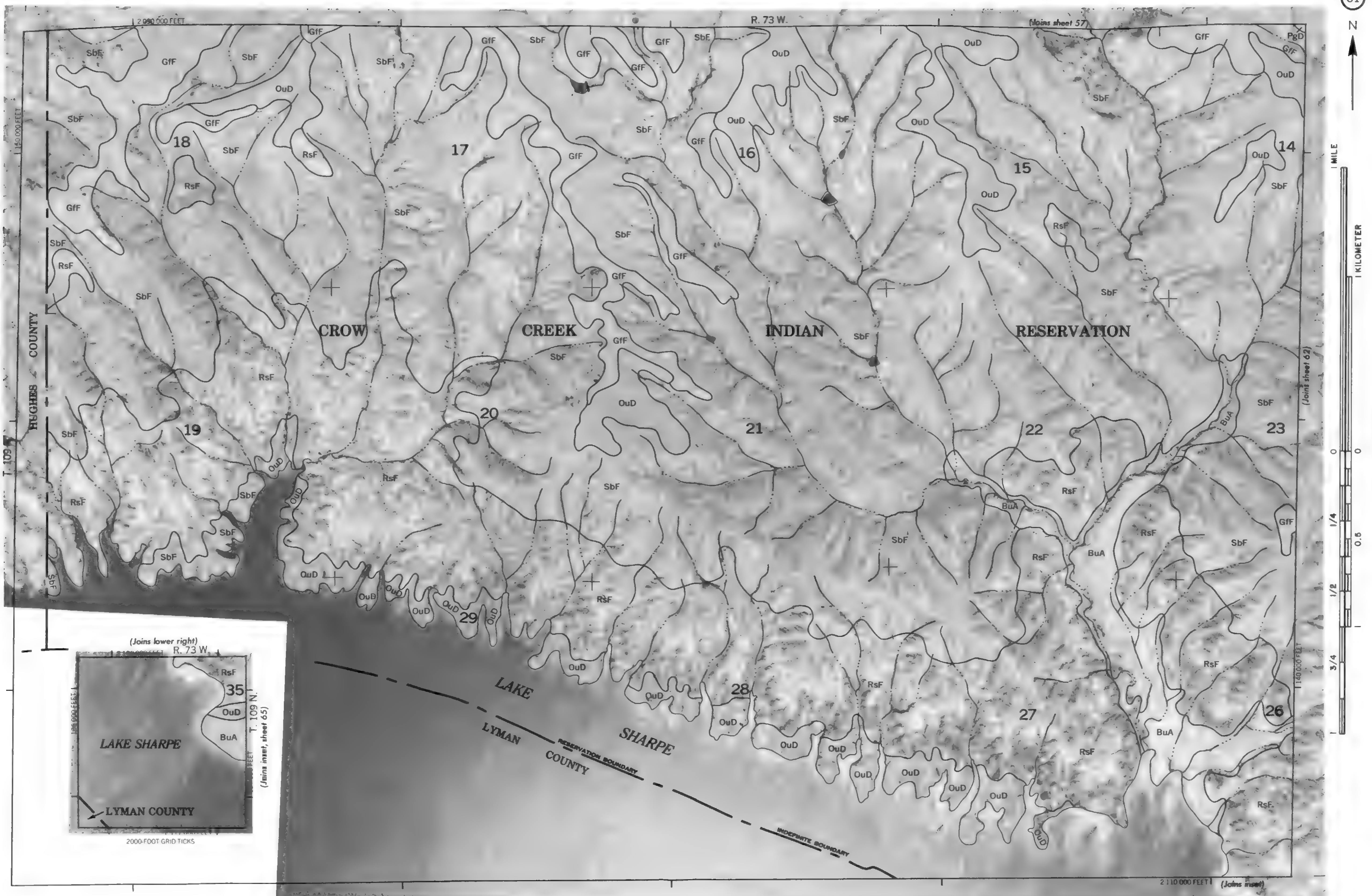

R. 73 W.
(Joins sheet 53)
(Joins sheet 58)
(Joins sheet 61)
HUGHES COUNTY
T. 110 N.
T. 109 N.
2 090 000 FEET
155 000 FEET
CROW CREEK INDIAN RESERVATION
Crow Creek
Rush
Chaney
31
32
33
34
35
6
5
4
3
2
7
8
9
10
11
N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
0.5


58
N
(Joins sheet 54)
R. 73 W. | R. 72 W.
2 135 000 FEET
165 000 FEET
T. 110 N.
T. 109 N.
(Joins sheet 57)
(Joins sheet 59)
(Joins sheet 62)
2 115 000 FEET
155 000 FEET
CROW CREEK INDIAN RESERVATION
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
0.5
water


59
N
(Joins sheet 55)
(Joins sheet 60)
(Joins sheet 63)
(Joins sheet 58)
R. 72 W. | R. 71 W.
T. 110 N.
T. 109 N.
2 140 000 FEET
2 155 000 FEET
165 000 FEET
155 000 FEET
CROW CREEK
INDIAN RESERVATION
34
35
36
31
32
3
2
1
6
5
10
11
12
7
8
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
0.5
water

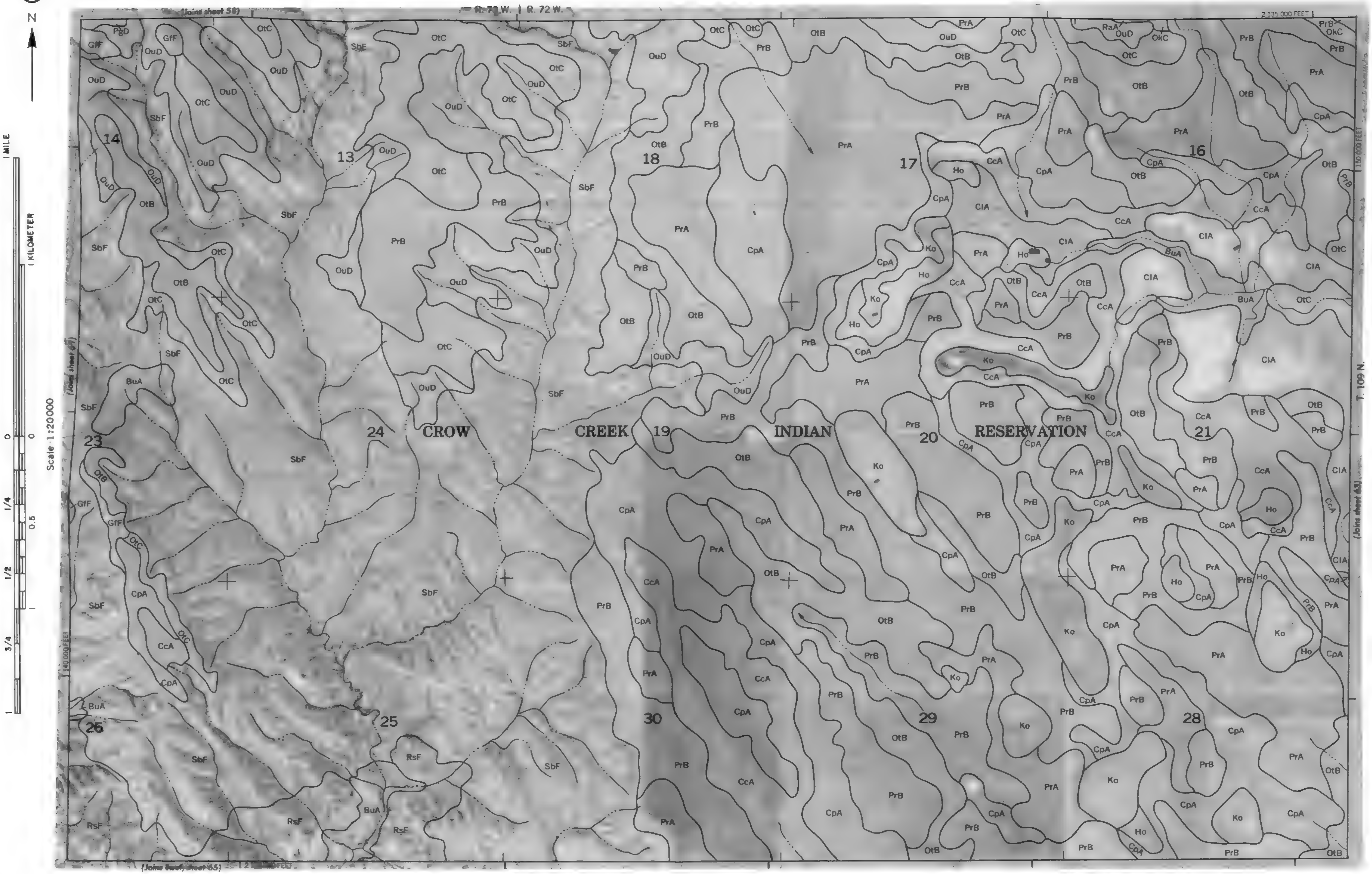


N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0.5
(Joins sheet 56)
(Joins sheet 59)
(Joins sheet 64)
R. 71 W.
T. 109 N.
T. 110 N.
HAND COUNTY
2 180 000 FEET
2 160 000 FEET
155 000 FEET
32
33
34
35
36
1
2
3
4
5
8
9
10
11
12

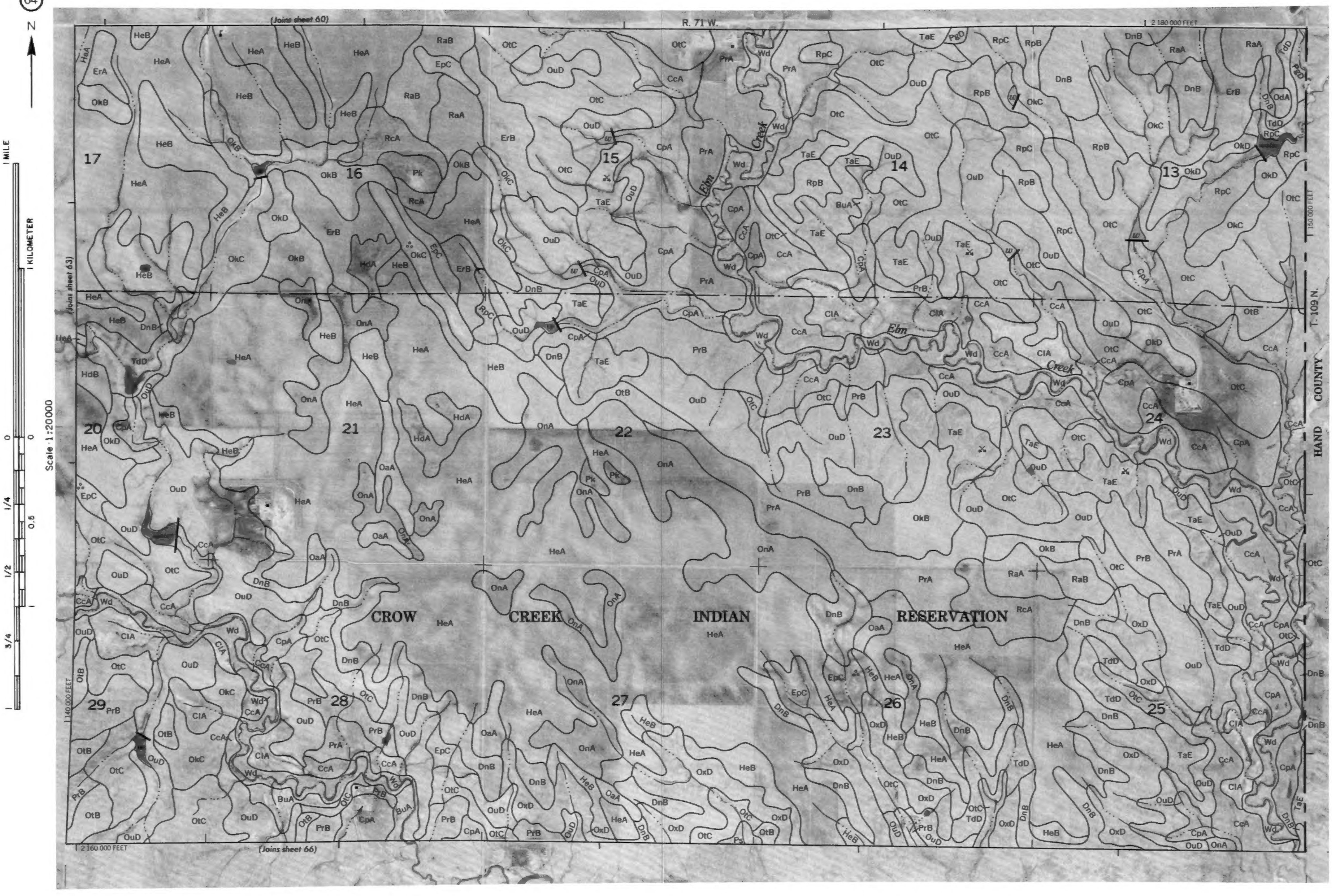


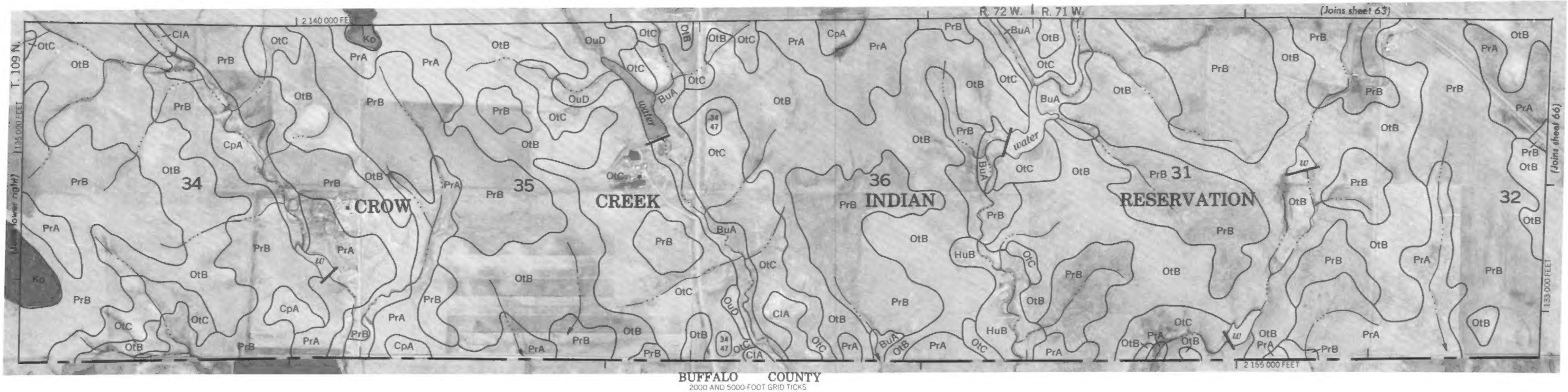
N
R. 73 W.
2 090 000 FEET
(Joins sheet 57)
(Joins sheet 62)
(Joins inset)
2 110 000 FEET
150 000 FEET
140 000 FEET
T. 109 N.
HUGHES COUNTY
CROW
CREEK
INDIAN
RESERVATION
LAKE
SHARPE
LYMAN
COUNTY
RESERVATION BOUNDARY
INDEFINITE BOUNDARY
14
15
16
17
18
19
20
21
22
23
26
27
28
29
SbF
GfF
OuD
RsF
BuA
PgD
(Joins lower right)
R. 73 W.
35
OuD
RsF
BuA
T. 109 N.
(Joins inset, sheet 65)
LAKE SHARPE
LYMAN COUNTY
2000-FOOT GRID TICKS
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
Scale 1:20000

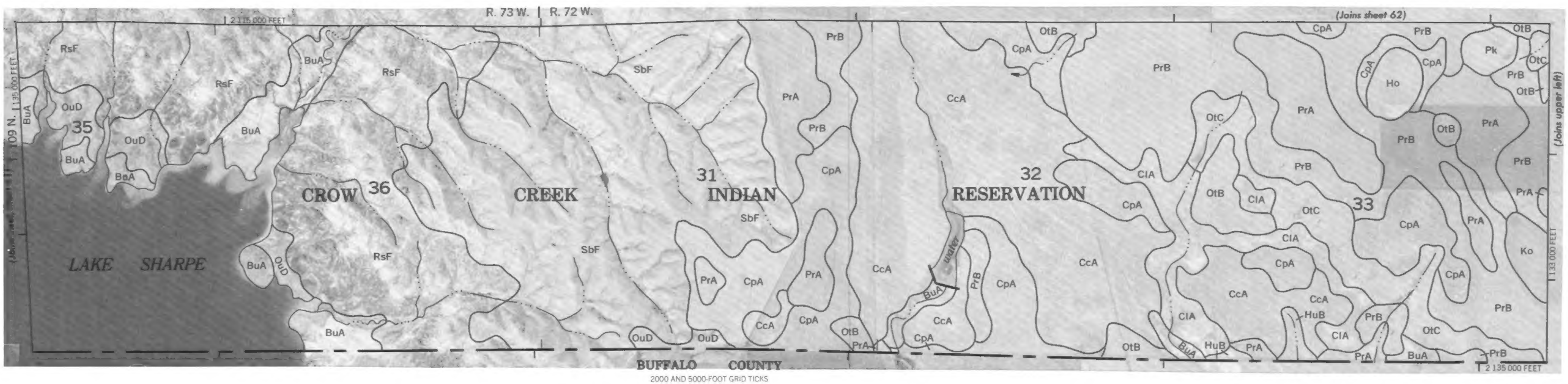
62

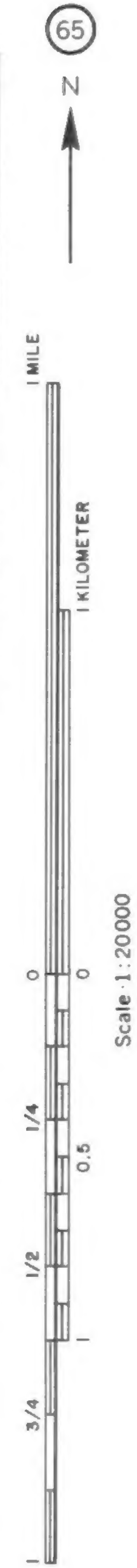

N
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 58)
R. 73 W. | R. 72 W.
2 135 000 FEET
(Joins sheet 61)
(Joins sheet 63)
(Joins sheet 65)
T. 109 N.
140 000 FEET
150 000 FEET
CROW CREEK INDIAN RESERVATION
13
14
16
17
18
19
20
21
23
24
25
26
28
29
30
PrB
PrA
OtB
OtC
OuD
SbF
CpA
CcA
ClA
Ko
Ho
BuA
GfF
RsF
OkC
RaA

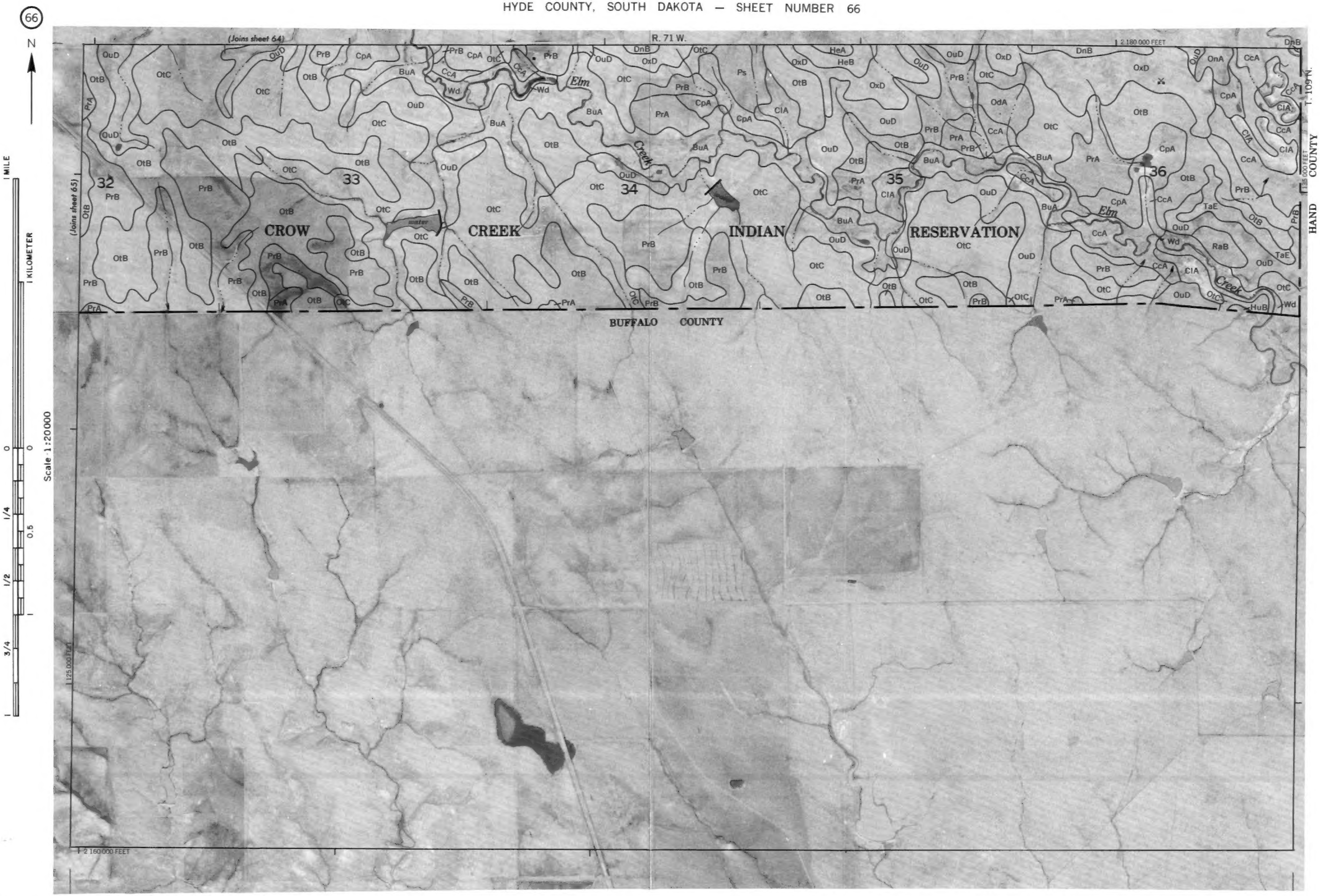

63
N
(Joins sheet 59)
R. 72 W. | R. 71 W.
2 140 000 FEET
150 000 FEET
T. 109 N.
(Joins sheet 62)
(Joins sheet 64)
(Joins sheet 65)
2 155 000 FEET
140 000 FEET
Lake Ambrose
Stephan
Stephan School
Lake Boehm
West Fork
Elm
Creek
Campbell
Creek
CROW CREEK INDIAN RESERVATION
1 MILE
1 KILOMETER
Scale 1:20 000


N
(Joins sheet 60)
R. 71 W.
2 180 000 FEET
(Joins sheet 63)
T. 109 N.
HAND COUNTY
150 000 FEET
140 000 FEET
2 160 000 FEET
(Joins sheet 66)
CROW CREEK INDIAN RESERVATION
Elm Creek
17
16
15
14
13
20
21
22
23
24
29
28
27
26
25
1 MILE
1 KILOMETER
Scale 1:20000
0
1/4
1/2
3/4
1
0
0.5
1


2 140 000 FEET
R. 72 W. | R. 71 W.
(Joins sheet 63)
T. 109 N.
135 000 FEET
(Joins lower right)
(Joins sheet 66)
133 000 FEET
2 155 000 FEET
34
35
36
31
32
CROW
CREEK
INDIAN
RESERVATION
BUFFALO COUNTY
2000 AND 5000-FOOT GRID TICKS


2 115 000 FEET
R. 73 W. | R. 72 W.
(Joins sheet 62)
T. 109 N.
135 000 FEET
(Joins upper left)
133 000 FEET
2 135 000 FEET
35
36
31
32
33
CROW
CREEK
INDIAN
RESERVATION
LAKE SHARPE
BUFFALO COUNTY
2000 AND 5000-FOOT GRID TICKS


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
Scale 1:20000


66
N
(Joins sheet 64)
R. 71 W.
2 180 000 FEET
T. 109 N.
(Joins sheet 65)
32
33
34
35
36
CROW
CREEK
INDIAN
RESERVATION
Elm
Creek
water
HAND COUNTY
135 000 FEET
BUFFALO COUNTY
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
Scale 1:20000
125 000 FEET
2 160 000 FEET